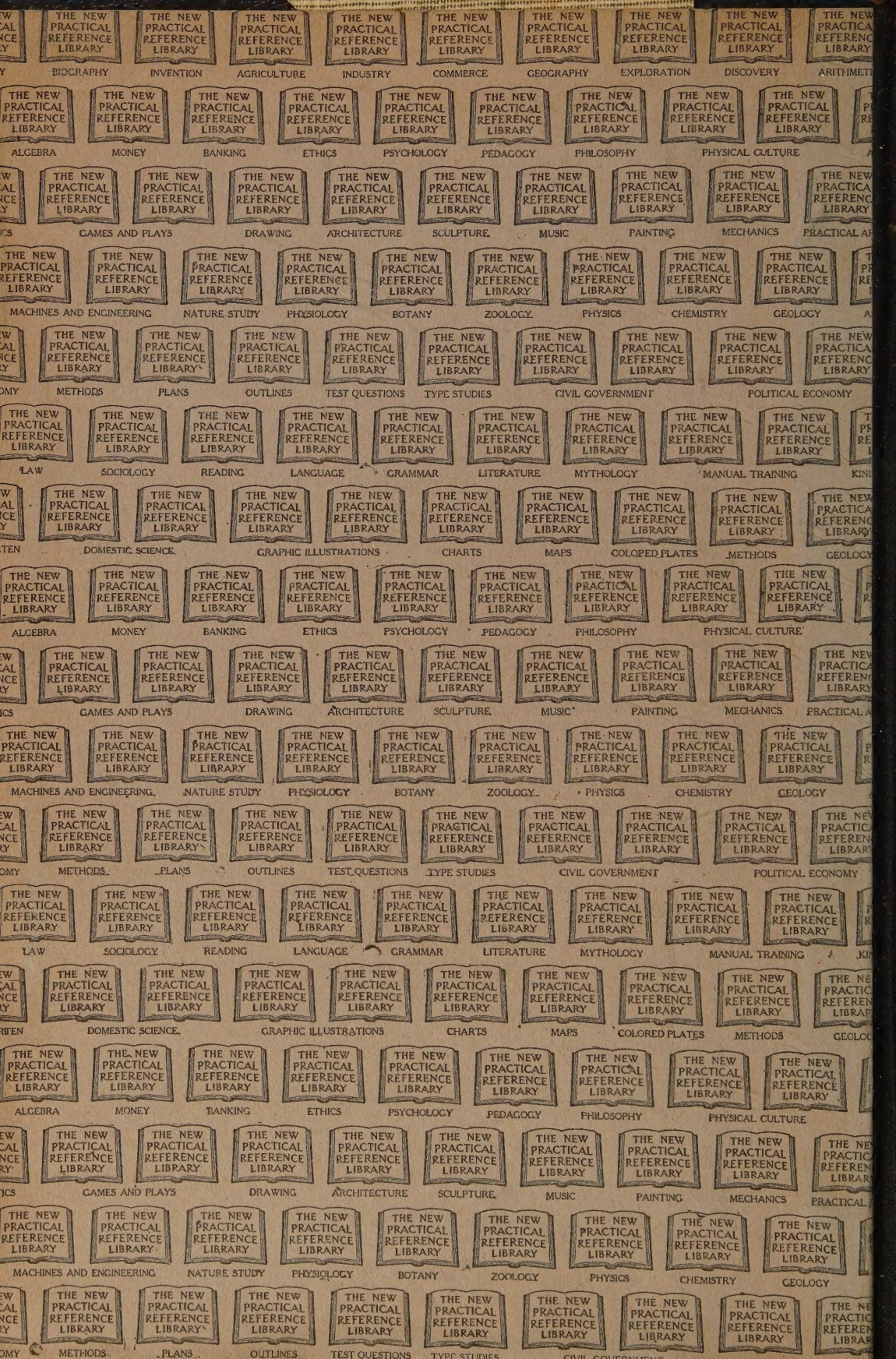
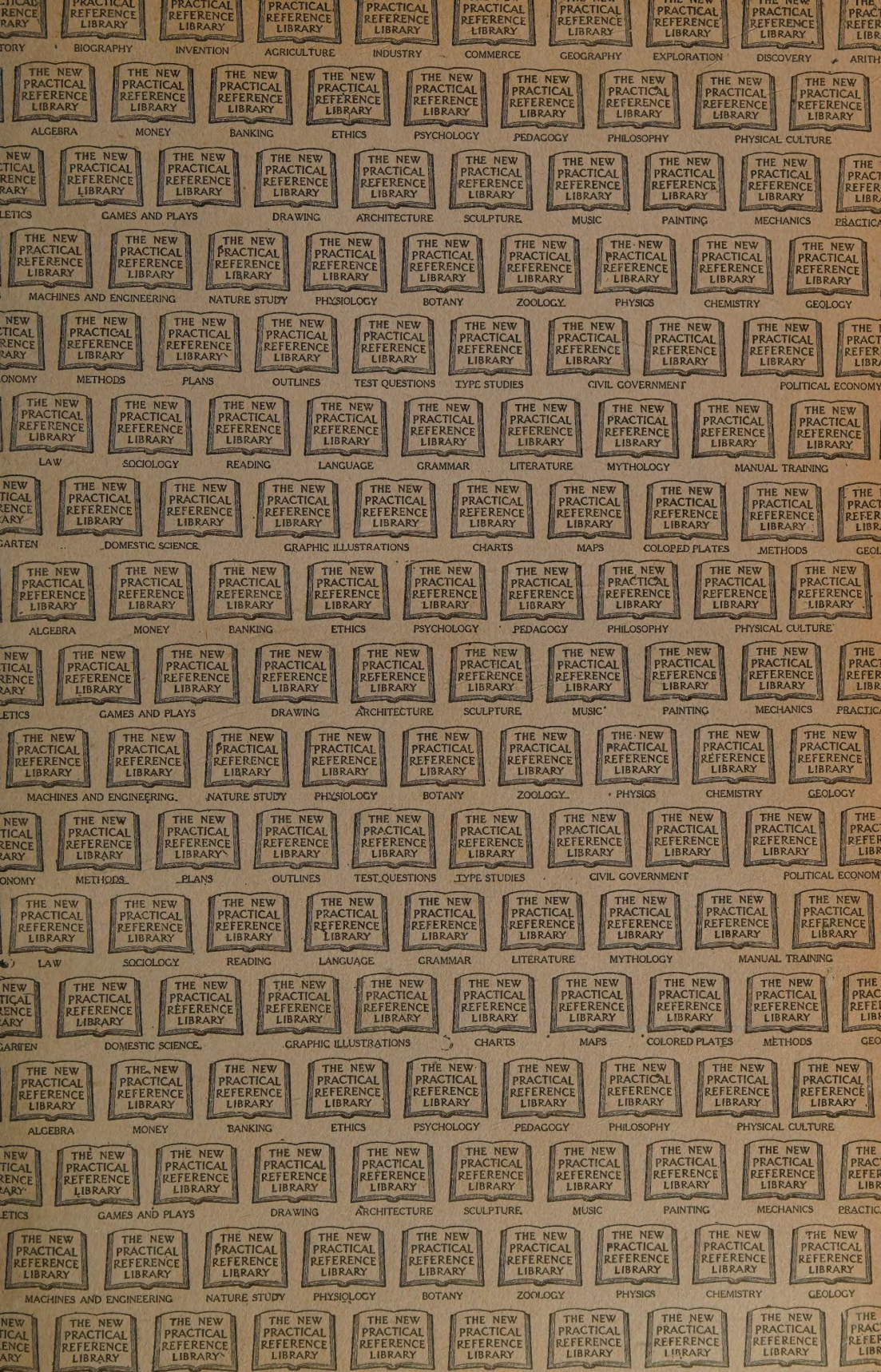








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CHLORATE, *klo'rate*, a salt of chloric acid. The chlorates are decomposed by a red heat, nearly all of them being converted into metallic chlorides, with evolution of pure oxygen.

They burn so quickly with easily-burning substances that an explosion is produced by slight causes. The chlorates of sodium and potassium are used in medicine. The latter, in doses of from five to twenty grains, is largely used in scarlet fever and inflamed throat. It is also used in the manufacture of matches, fireworks and percussion caps.

Chlorine, *klo'rin* or *klo'reen*, an elementary gaseous substance, discovered by Scheele in 1774. It was afterward proved by Davy to be a simple body, and from its peculiar yellowish-green color the name chlorine was given to it. It is always found in nature in a state of combination. United with sodium it occurs very largely as the chloride of sodium, or common salt, from which it is liberated by the action of sulphuric acid and manganese dioxide. Chlorine is a very heavy gas, being about two and a half times as heavy as ordinary air; it has a peculiar smell, and when inhaled irritates the nostrils most violently, and also the windpipe and lungs. It is not combustible, though it supports the combustion of many bodies. In combination with other elements it forms chlorides, which have most important parts in many manufacturing processes, as well as chlorates and chlorites. Chlorine may be liquefied by cold and pressure, and then it becomes a transparent, greenish-yellow, limpid liquid. Chlorine is a very powerful bleaching agent. Hence, in the manufacture of bleaching powder, it is used in immense quantities. It is a valuable disinfectant where it can be conveniently applied, as in the form of chloride of lime.

Chlorite Schist, *klo'rite shist*, a mineral of a grass-green color, opaque, usually friable or easily pulverized, composed of little spangles, scales, prisms or shining small grains, and consisting of silica, alumina, magnesia and protoxide of iron. It is closely allied in character to mica and talc. See MICA; TALC.

Chloroform, *klo'ro form*, a volatile, colorless liquid of an agreeable, fragrant, sweetish, apple taste and smell. It was discovered by Soubeiran and Liebig in 1831. It is prepared by cautiously distilling a mixture of alcohol, water and chloride of lime, or bleaching powder. Its use as an anesthetic was introduced in 1847 by Professor James Y. Simpson, of Edinburgh. For this purpose its vapor is inhaled. The

inhalation of chloroform first produces slight intoxication; then, frequently, slight muscular contractions, unruliness and dreaming; then loss of voluntary motion and consciousness, the patient appearing as if sound asleep, and at last, if too much be given, death by coma and syncope. When skillfully administered in proper cases, it is considered one of the safest of anesthetics; but in its use certain precautions must be observed, as its application has frequently proved fatal. Chloroform is a powerful solvent, dissolving resins, wax, iodine, strychnine and other substances.

Chlorophyll, *klo'ro fil*, the green coloring matter of plants, which plays the most important part in plant life, as it breaks up the carbonic acid gas taken in by the leaves, into two elements, returning the oxygen to the air and converting the carbon, with the water obtained from the roots, into starch. Starch can be formed by leaves only in the presence of light. Hence, leaves which are deprived of light, bleach or turn white.

Choate, *chote*, JOSEPH HODGES (1832-), an American lawyer and diplomat, born at



JOSEPH HODGES CHOATE

Salem, Mass. He was educated at Harvard University and Law School, and settled in New York, where he gained the highest distinction as a lawyer, especially in the prosecution of the Tweed Ring and in the Income Tax Cases before the Supreme Court. He represented the

United States in the Bering Sea controversy, and in 1899 he was nominated by President McKinley as ambassador to Great Britain. He served with rare ability until 1905, when he returned to his practice in New York.

Choate, RUFUS (1799-1859), an American jurist and orator, born at Ipswich, Mass. In 1830 he was elected to Congress, being reelected in 1832. In 1841 he succeeded Daniel Webster in the United States Senate, serving until 1845. He was probably the most scholarly of American public men and was among the greatest forensic orators America has produced. In his long career of thirty-six years as a lawyer, he lost but few cases, owing to his exceptional power as an advocate before juries.

Choc'olate, a paste composed of the kernels of the cacao tree, ground and combined with sugar and vanilla, cinnamon or other flavoring substance; also, a drink made by dissolving chocolate in boiling water or milk. Chocolate was used in Mexico long before the arrival of the Spaniards, and it is now largely used in South America, Spain, Italy and Germany, but in England cocoa, which is a preparation from the same fruit, is much more common. The cocoa bean, from which chocolate is made, is the seed of a mushy pod, which is the fruit of the cacao, or cocoa, tree. This tree is found in Central America, Mexico, South America, the West and East Indies, Brazil and Caracas. The cocoa bean is about the size of a pecan nut. The kernel of the bean is called the *nib*, and from the nibs chocolate and cocoa are made. The beans are roasted for the purpose of making the shells brittle, so they will come off easily. When cooled, the beans are run through a machine, which removes the shells and leaves the nibs free and clean. The nibs are then ground to a thick paste. The ground chocolate is placed in kettles for more complete stirring; then, after having been transferred to tins, it is taken to the cooling room to harden into cakes, which are afterwards wrapped for shipment.

Choc'taw, the most advanced and one of the largest of the indian tribes, living in the southern United States, east of the Mississippi. De Soto met them in 1540 and fought a bloody and destructive battle. When the French came, the Choctaw immediately formed a friendship with them. Under the United States they met with the fate of other tribes, and in 1837 they were removed to the Indian Territory, where they established their independent government, built churches, erected school buildings and

under a well-established system of laws lived happily till their friendship with the South in the Rebellion lost for them a large portion of their lands. In 1900, in the Choctaw nation there were about 10,000 indians, the same number of negroes and 8000 whites. See FIVE CIVILIZED TRIBES.

Choiseul-Amboise, *shwah zul'ahN bwahz'*, ETIENNE FRANCOIS, Duc de (1719-1785), a French statesman. After distinguishing himself in the War of Austrian Succession, he returned to Paris, where the favor of Madame de Pompadour furnished the means of gratifying his ambition. He served as ambassador at Rome and later at Vienna, and then became in reality prime minister of France. While holding this position he was one of the commission to negotiate the treaty which closed the French and Indian War, and at the time he prophesied the rebellion of the American colonies within twenty-five years. His fall was brought about in 1770 by a court intrigue, supported by Madame du Barry, the new favorite of the king. He was banished to his estates, but his advice in political matters was frequently taken by Louis XVI.

Choke Damp or **After Damp**, the name given to the gas found in coal mines after an explosion of fire damp. See CARBONIC ACID GAS.

Cholera, *kol'e rah*, ASIATIC, a contagious and very fatal disease, cases of which are almost always present in certain warmer parts of Asia. From these localities the disease has from time to time spread into other parts of the world, and caused epidemics accompanied by terrible loss of life. The disease first appeared in Europe in 1829, and in 1831 spread to America. Sometimes the patient is suddenly stricken down and dies within a few hours. In the more ordinary form, the disease commences with vomiting and purging, which increase in violence for from twelve to thirty-six hours, soon after which the patient dies in fever, or recovers. It has been learned that the contagious element is carried off in the excrement of cholera patients and is communicated to other persons through water or food. Doctor Koch maintains that the cause of the disease is a bacillus, which enters the small intestines and multiplies there with extraordinary rapidity. From being shaped like a minute, curved rod, it has been called the *comma bacillus*. The cholera is a filth disease, and the only successful means of arresting an epidemic is the establishment of the most rigid sanitary regulations. Not only should the patient be promptly isolated, but all excrement

should be destroyed and every article used about the patient should be carefully disinfected by steam or, in the case of vessels, by being washed in a five per cent solution of carbolic acid, followed by washing in boiling water. All who have to do with a cholera patient should be extremely careful to cleanse their faces, hands and clothes, and should not go out among other people without the most rigid disinfection. In the United States, no ship from a cholera-infected port is permitted to land its passengers until after a five days' quarantine, and if cholera has been on board, the ship is held until at least a week has elapsed without a case of the disease.

Cholera Morbus is a disease which usually occurs during the summer and is characterized by copious vomiting and purging, with violent griping and cramps of the abdomen and lower extremities, accompanied by great weakness. It is usually caused by overloading the stomach, by excessive drinking of ice water or by eating indigestible or impure food.

Cholera Infantum is a name sometimes given to a severe and dangerous diarrhea to which infants are subject in hot climates, or in the hot season in temperate regions.

Cholula, *cho loo'lah*, a town of Mexico, situated 60 mi. s. e. of Mexico. It was formerly a large city, the seat of the religion of the Aztecs, or ancient Mexicans. Cortez found there more than 400 temples and 20,000 houses. One of the temples, built in the form of a pyramid, still remains, each side of its base measuring 1440 feet, and its height over 164 feet. On the top is a chapel of Spanish origin. Population, 10,000.

Chopin, *sho paN'*, FREDERIC FRANCOIS (1809-1849), a celebrated pianist and musical composer, of French extraction, born at Warsaw, Poland. He went to Paris in 1831, on account of the political troubles in Poland, and remained there almost till his death. As pianist he attracted the attention of critics before he was twenty years old, and at the same age he had composed several mazurkas and nocturnes, which still stand among the best extant, he himself never excelling and rarely equaling his early powers. All of his works display a rare gift of poetic fancy and beautiful melody, and they abound in passages of the greatest difficulty, but are never harsh or strained.

Chopsticks, the Chinese substitute for knife, fork and spoon at meals. They consist of two smooth sticks of bamboo, wood or ivory, which

are used for conveying meat to the mouth. The Chinese use them with great dexterity.

Choragic, *ko raj'ik*, **Monument**, of Lysicrates, the beautiful monument erected in 334 B. C. in Athens, and still standing. It was built in honor of the choragus, or music director, Lysicrates, who had received a prize for exhibiting the best musical performance. For a long time it was called the *Lantern of Demosthenes*, because of the story that Demosthenes had lived in it. It is also said that it was used by Lord Byron as a study.

Chord, *kord*, in music, the simultaneous sounding of different tones. The common chord consists of a fundamental note and the third and fifth notes in the scale beginning with the fundamental note. When the interval between the fundamental note and its third is two full tones, the combination is a *major chord*; when the interval is a tone and a half, the combination is termed a *minor chord*; when the intervals between the bass note and its third, and between the third and the fifth, are each a tone and a half, the chord is called *diminished*. The *tonic chord* is made up of the key note and its third and fifth; the *dominant chord* consists of the dominant, or fifth, of the scale, accompanied by its third and fifth; the *subdominant chord* consists of the subdominant, or fourth, of the scale, and its third and fifth.

Chorea, *ko re'ah*. See SAINT VITUS'S DANCE.

Chorus, *ko'rus*, originally an ancient Greek term for a troop of singers and dancers, intended to heighten the pomp and solemnity of festivals. During the most flourishing period of ancient tragedy (500-400 B. C.), the Greek chorus was a troop of males and females, who, during the whole representation, never quitted the stage, in the intervals of the action chanting songs. In the beginning it consisted of a great number of persons, sometimes as many as fifty; but the number was afterward limited to fifteen.

In music the chorus is that part of a composite vocal performance which is executed by the whole body of singers, in distinction to the solo airs and passages for selected voices. The singers who join in the chorus are also called the chorus. The term is also applied to the verses of a song in which singers join the soloist, or the union of a company with a singer in repeating certain couplets or verses at certain periods in a song, these verses being also called choruses.

Christ (meaning *an anointed one*), a title of Jesus of Nazareth, now used almost as a name or as part of his name.

Christ'church, a town of New Zealand, capital of the province of Canterbury and the see of the primate of New Zealand, situated on the Avon River, 7 mi. from the sea. It contains a number of handsome buildings, among which are the provincial government offices, the cathedral, Saint Michael's church, the supreme court and the town library. There are high class educational institutions, a fine park and a botanic garden. Population in 1911, 53,116.

Chris'tian IX (1818-1906), king of Denmark, succeeded to the throne in 1863. His family connections among the reigning houses of Europe were remarkable. His eldest daughter, Alexandra, was the wife of Edward VII of England; his second daughter, Dagmar, the mother of Czar Nicholas II of Russia; his second son, George I, king of Greece.

Christian X (1870-), king of Denmark, son of Frederick VIII and grandson of Christian IX. He succeeded to the throne on May 14, 1912, on the death of his father. He was not without experience in the affairs of the kingdom, for he had frequently been left in charge during his father's absence. His first speech, promising to guard the happiness and liberty of his people, won him popularity.

Christian Endeavor, **THE UNITED SOCIETY OF**, an interdenominational religious organization of young people of the Protestant churches. The first society was organized by Rev. Francis Clark, D.D., at Portland, Maine, in 1881, and numbered about fifty members. The principles upon which the society is founded are: "Personal faith in Jesus Christ; loyalty to the individual church and to the denominational organization and loyalty to the universal church of Christ in every land." The society has an interdenominational board of over 100 trustees, whose powers are simply advisory and who act as a bureau of information; it is in no sense a body of control. Every local society is entirely under the control of its own church and denomination. The society had in July, 1912, 79,077 societies, with a membership of 3,953,850, chiefly in the United States, Canada and Great Britain, and in Australia, China, Japan, India and other missionary lands.

Christian Era, the great era now almost universally employed in Christian countries for the computation of time, supposed to begin with the birth of Christ. The custom of reckoning time from the birth of Christ was introduced in the sixth century by a monk named Dionysius; but it is believed that in his compu-

tations he made a mistake of about four years, so that, according to the best authorities, Christ was born about four years before the beginning of our era. The practice of computing time from Christ's birth did not become general until the fifteenth century.

Christiania or **Kristiania**, *krees te ah'ne a*, a city and port, the capital of Norway, at the head of the long, narrow inlet called Christiania Fjord, about 60 mi. from the open sea, or Skagerrak. The houses are mostly of brick and stone, generally plain buildings, devoid of architectural pretension. Among the important public buildings are the royal palace, the house of representatives, or Storting (parliament), the governor's palace, a citadel, the great arsenal of the kingdom, a university, the Trinity church and the cathedral. Attached to the university, the only one in Norway, opened in 1813, is a museum containing a fine collection of antiquities. The city is quite important commercially and is the principal seaport of Norway. The manufactures consist of woolen cloth, ironware, tobacco, paper, leather, soap, spirits and glass, and there are extensive breweries. Population in 1910, 241,834.

Christian'ity, the religion instituted by Jesus Christ. It teaches that there is no salvation without Christ's atonement, without faith in God and a belief in the gospels. Though the great moral principles which it reveals and teaches and the main doctrines of the gospel have been preserved without interruption, the genius of the different nations and ages has materially colored its character. The first community of the followers of Jesus was formed at Jerusalem soon after the death of their Master. Another was formed at Antioch in Syria about 65 A. D., where the followers of Jesus were first called *Christians*. The travels of the apostles spread Christianity through the provinces of the Roman Empire, Palestine, Syria, Asia Minor, Greece, the islands of the Mediterranean, Italy and the northern coast of Africa, as early as the first century. At the end of the third century almost one-half of the inhabitants of the Roman Empire, and of several neighboring countries, professed this belief, and in the twentieth century it is still spreading through missionary work. Many heretical branches sprang from the main trunk. From the Gnostics, who date from the days of the apostles, to the Nestorians of the fifth century, the number of sects was large, and some of them exist to the present day. The most important events in the subsequent history of Christianity

are the separation of the Eastern and Western churches early in the eighth century, and the Western reformation, which may be said to have commenced with the sectaries of the thirteenth century and ended with the establishment of Protestantism in the sixteenth. The number of Christians now in the world is computed at 477,000,000. Of these about 230,000,000 are Roman Catholics, 98,000,000 belong to the Greek Church and 149,000,000 are Protestants.

Christians or Disciples of Christ, a religious body which took form in the United States from the activities of Thomas and Alexander Campbell in Western Pennsylvania, Western Virginia and Ohio. The leaders were formerly Presbyterians, but, accepting immersion, they were later associated for a time with the Baptist Church. Closely allied to this movement at one time was that of the Christian Connection, under the leadership of Rev. B. W. Stone of Kentucky. Later on separations occurred which led to the development of the Christian Church, or the Disciples of Christ, under the leadership of the Campbells and their associates, notably Walter Scott and B. W. Stone. Their chief articles of faith are the New Testament as the only creed, the unity of the Church of Christ, baptism as the immersion of believers, and weekly celebration of the Lord's Supper. The Disciples have more than 13,000 churches, 8000 ministers and 1,533,000 members.

Christian Scientists (The Church of Christ, Scientist), a Christian sect originated in 1866 by Mary Baker Eddy, whose book, *Science and Health with Key to the Scriptures*, containing a complete statement of the teachings and practice of Christian Science, is the text-book of the denomination. Christian Science is based upon the proposition that God is all in all, the only self-existent, infinite Being or Life, and that man in the image and likeness of God is spiritual and not material. This system of religious teaching differs from all others in its declaration that evil and matter are unreal and illusive, since God who is infinite Good and is Spirit, or Mind, cannot create, or be manifested in, anything unlike Himself. The truthfulness of this concept, it is declared, can be and is proved by actual demonstration of healing and regeneration through Christ as the universal spiritual ideal. Christ Jesus is regarded by Christian Scientists as the individual ideal of Truth.

The denomination has over 1,400 church organizations in the world. Large and beautiful church edifices have been erected and dedicated

in Boston, New York, Chicago, Detroit, Los Angeles, London, England, and in many other cities. The Christian Science Church was founded by Mrs. Eddy in 1879 "to commemorate the word and works of our Master, which should reinstate primitive Christianity and its lost element of healing." In 1892 the church was reorganized as The First Church of Christ, Scientist, in Boston, Massachusetts, known as The Mother Church. All Christian Science churches are branches of The Mother Church. Lesson-sermons compiled from the Bible and *Science and Health with Key to the Scriptures* are read at the Sunday services in these churches.

All Christian Science churches maintain free public reading rooms where those seeking information on the subject of Christian Science have access to the Bible, *Science and Health*, Mrs. Eddy's other works, and the periodical literature of the denomination. Over five thousand authorized Christian Science practitioners are regularly devoting their time to the practice of Christian Science Mind healing. See EDDY, MARY BAKER.

Christina, *kre stee'nah* (1626-1689), queen of Sweden, daughter of Gustavus Adolphus. After the death of Gustavus, the States-General appointed guardians to the queen Christina, but in 1644 she took upon herself the government. A talent for business and great firmness of purpose distinguished her first steps, but she was so eccentric that she accomplished little of importance. Her patronage of learned men, artists and the like was lavish to the point of extravagance. In 1650 she caused herself to be crowned with great pomp, and with the title of *king*, but in 1654 she abdicated in favor of her cousin Charles Gustavus.

Christmas, *kris'mas*, the festival of the Christian church, observed annually on December 25, in memory of the birth of Christ, and celebrated by a particular church service. The time when the festival was first observed is not known with certainty; but it is spoken of in the beginning of the third century by Clement of Alexandria, and in the latter part of the fourth century Chrysostom speaks of it as of great antiquity. As to the day on which it was celebrated, there was long considerable diversity, but by the time of Chrysostom the Western church had fixed on December 25, though no certain knowledge of the day of Christ's birth existed; and the Eastern church, which had favored January 6, gradually adopted the same date. The existence of heathen festivals cele-

brated on or about this day doubtless accounted in large measure for its selection; and Brumalia, a Roman festival held at the winter solstice, when the sun is, as it were, born anew, has often been mentioned as having a strong bearing on the question. In the Catholic, Greek, Anglican and Lutheran churches, there is a special religious service for Christmas day; and, contrary to the general rule, a Catholic priest can celebrate three masses on this day. Most other churches hold no special service, but almost everywhere throughout Christendom it is kept as a holiday and occasion of social enjoyment.

Christmas Rose, the black hellebore, so called from its flower, which resembles a large white rose. Its foliage is dark and evergreen, and the plant blossoms during the winter months.

Christy, HOWARD CHANDLER (1873—), an American illustrator, born in Morgan co., Ohio. In 1893 he went to New York, and soon afterward his work began to appear in magazines. Particularly popular were his drawings of men and women in high life. During the Spanish-American War he went to Cuba, and furnished articles and illustrations for *Scribner's Magazine*, *Harper's Magazine* and *Collier's Weekly*. He illustrated many works of fiction, and each year for several years produced pictures in color for a gift-book edition of some one of Riley's poems.

Chromatic, *kro mat'ik*, in music, a term applied to notes and peculiarities not belonging to the diatonic scale. Thus, a *chromatic chord* is a chord which contains a note or notes foreign to the diatonic scale; *chromatic harmony*, harmony consisting of chromatic chords. The *chromatic scale* is a scale made up of thirteen successive semitones, that is, the eight diatonic tones and the five inserted intermediate tones. See MUSIC.

Chrome, *krome*, **Yel'low**, a chromate of lead, a beautiful pigment, much used in the arts, varying in shade from deep orange to a pale canary yellow.

Chromite, *kro'mite*, or **Chro'mic Iron Ore**, a compound of iron, chromium and magnesia of black or brownish-black color. Chromite is the most important source of chromium, and it is also extensively used in the manufacture of paints. In the United States it occurs in abundance in the Appalachian and the Rocky Mountain regions, and in Europe it is found in Norway, the Shetland Islands, Bohemia and France.

Chromium, a metal which forms very hard steel-gray masses. It never occurs free, but

may be obtained by reducing the oxide. In its highest degree of oxidation it forms a compound of a ruby-red color. In the pure state it has no practical applications. It takes its name from the various and beautiful colors which its oxide and acid communicate to minerals into whose composition they enter. It is the coloring matter of the emerald and beryl. Chromium is employed to give a fine, deep green to the enamel of porcelain and to glass. The oxide of chromium is of a bright grass-green or pale yellow color. This element was originally discovered in 1797 by Vanquelin, in the native chromate of lead of Siberia. See CHROME YELLOW.

Chronicles, *kron'e klz*, BOOKS OF, (acts of the days), two books of the Old Testament, which formed only one book in the Hebrew canon, in which it is placed last. Its division into two parts is the work of the Seventy, who gave it the title *Paraleipomena*, meaning *things omitted*. The name *Chronicles* was given to it by Jerome. The book is one of the latest compositions of the Old Testament and is supposed to have been written by the same hand as Ezra and Nehemiah. According to its contents the book forms three great parts: 1, genealogical tables; 2, the history of the reigns of David and Solomon; 3, the history of the kingdom of Judah from the separation under Rehoboam to the Babylonian captivity, with a notice in the last two verses of the permission granted by Cyrus to the exiles to return home and rebuild their temple. The *Chronicles* present many points of contact with the earlier scriptures, historical and prophetic, especially with the books of *Samuel* and of *Kings*.

Chron'ogram, a device by which a date is given in numeral letters by selecting certain letters of an inscription and printing them larger than the others, as in the motto of a medal struck by Gustavus Adolphus in 1632: ChrIstVs DVX; ergo trIVMphVs; where the values of C and the other capitals regarded as Roman numerals gives the required figure when added together.

Chron'ogram, an instrument for measuring and recording minute portions of time. While there are several patterns of chronograph, they all operate on the same principle, and the most common pattern is that of a watch, which has in addition to the ordinary hands two second hands, called by some the second hand and two halves, and placed one above the other. The outer end of the lower hand has a small cup, which is filled with a blackfluid, and has a

minute hole at the bottom, while the corresponding end of the upper hand is bent down so as just to reach the hole. One of the most common uses of this instrument is in timing races. At the starting of the race the observer presses a spring, whereupon the bent end of the upper hand passes through the hole in the cup and makes a black mark on the dial, instantly rebounding. As each horse passes the winning post, the spring is pressed and a dot is made. Thus the time occupied by each horse is noted. A chronograph of this pattern will register to one-tenth of a second. Much more delicate instruments, however, are used in astronomical observatories, for measuring the time when a heavenly body, such as a star, reaches a given position. Instruments of this sort will register to the thousandth of a second, when operated by electricity.

Chronology, the science which treats of time and has for its object the arrangement and exhibition of historical events in order of time, and the ascertaining of the intervals between them. Its basis is necessarily the method of measuring or computing time by regular divisions or periods, according to the revolutions of the earth or moon. The motions of these bodies produce the natural division of time into years, months and days. As there can be no exact computation of time or placing of events without a fixed point from which to start, dates are fixed from an arbitrary point, or *epoch*, which forms the beginning of an *era*. Thus, the epoch almost universally in use to-day, as the point from which all events are dated, is the birth of Christ. The letters B. C. and A. D. (*Anno Domini*, in the year of our Lord) are used to designate respectively dates before and after the birth of Christ. Among the Greeks time was reckoned by Olympiads, the four-year intervals between successive games, and the beginning of their era was approximately 776 B. C. The Romans calculated from the time of the founding of Rome, 753 B. C., and the Mohammedans from the flight of Mohammed (See *HEGIRA*).

Chronometer, any instrument that measures time, as a clock, watch or dial; but, specifically, the term applied to those time-keepers which are used for determining the longitude at sea, or for any other purpose where accurate measurement of time is required, with great portability in the instrument. Marine chronometers generally beat half seconds, and are hung in gimbals in boxes six or eight inches

square. The pocket chronometer does not differ in appearance from a watch, except that it is somewhat larger. See *WATCH*.

Chrysalis, *kris'a lis*, an intermediate form which butterflies, moths and many other insects assume, after they cease to be larvae and before they reach their winged, or perfect, state. While in the chrysalis state, the animal is resting in apparent insensibility, entirely without food, though it continues to breathe. The chrysalis in most cases is protected from observation by its color, which closely resembles the object to which it is attached. In some cases the larva weaves around itself a cocoon, in which the change to the pupa stage takes place.

Chrysanthemum, a large genus of plants, resembling the asters. Some are herbs, and others are shrubs. They bear large heads of flowers on the ends of the stems or branches. Two species are common weeds in Great Britain: the *ox-eye daisy*, a meadow plant with white ray flowers, and the *corn marigold*, a weed with golden-yellow ray flowers. The former has been introduced and become common in the United States. The gorgeous chrysanthemums of the gardens are varieties of Chinese and Japanese plants. These are extensively cultivated in the hothouses of most countries and are remarkable for the great variety of form and the brilliancy of color which they show during the period of their autumn blooming. The chrysanthemum is the national flower of Japan, and the open variety with sixteen ray flowers is the imperial emblem.

Chrysoberyl, a variety of beryl that occurs in six-sided crystals which are sometimes compressed. It contains considerable alumina, has a glassy luster and is of various shades of green. Occasional specimens appear red when held between the eye and the light. One variety forms the gem called *cat's-eye*, and other varieties suitable for gems are occasionally found, but most specimens are of inferior quality. It is known as oriental topaz and oriental chrysolite, and is found in Ceylon, the Ural Mountains and Brazil. In the United States, chrysoberyl occurs at Haddam, Connecticut, and at Stow, Norway and various other localities in Maine.

Chrysolite, a mineral composed of silica, magnesium and iron. Its prevailing color is some shade of green. It is harder than glass, but is less hard than quartz; it is often transparent, sometimes only translucent. Very fine specimens are found in Egypt and Brazil, and it occurs in large quantities in Macon co.,

North Carolina, but it is of little value as a jeweler's stone.

Chrysoprase, *kris'o praze*, a stone found in small quantities in Germany and some parts of America, formerly much prized as a gem. It is apple-green in color, but under the influence of heat it loses its brilliance and is therefore not much used. It is mentioned in the Bible, and was probably known to the ancients.

Chrys'ostom, JOHN, Saint (about 345-407), "the golden-mouthed" (so named from the grandeur of his eloquence), a celebrated Greek father of the Church. He studied eloquence with Libanius, the most famous orator of his time, and soon excelled his master. After having studied philosophy with Andragathius, he devoted himself to the Holy Scriptures and determined to quit the world and consecrate his life to God in the deserts of Syria. After six years spent in retirement, studying and meditating, he was forced by illness to return to Antioch. He was ordained deacon and presbyter, and in 398 he went to Constantinople. Here the faithful discharge of his duties in lessening expenses and trying to reform the clergy led to his banishment to the Armenian highlands. Because of sympathy shown him, the emperor banished him to Pityus, on the northeast shore of the Black Sea. Chrysostom died on the journey.

Chub, a European river fish, of the carp family. The body is oblong, nearly round,



CHUB

and the head is broad. The head and back are green, the sides are silvery and the belly is white. This fish frequents deep holes in rivers shaded by trees, but in warm weather floats near the surface and furnishes sport for anglers. It is of little account as food and rarely attains the weight of five pounds. Allied American species receive the same name. See DACE.

Chuquisaca, *choo'ke sah'ka*. See SUCRE.

Church, a word which in its widest sense denotes the whole community of Christians and was thus used by the New Testament writers. In a more restricted meaning, it

denotes a particular section of the Christian community, differing in doctrinal matters from the remainder, as the Roman Catholic Church, the Protestant Church, or the leading church of a nation, as the English, Scotch or French Church. In yet another sense, it signifies an edifice appropriated to Christian worship. After the conversion of Constantine, the basilicas or public halls and courts of judicature and some of the heathen temples were consecrated as Christian churches. When churches came to be specially built for Christian worship, the forms were various, but later the form with the cross aisle or transept became common. Early British churches were built of wood, the first stone churches erected being that of Whithorn, Galloway (sixth century), and that of York (seventh century). A smaller kind is usually designated a *chapel*. Churches are classed as *cathedral*, when containing a bishop's throne; *collegiate*, when served by a dean and chapter; *conventual* or *minster*, when connected with a convent or monastery; *abbey* or *priory*, when under an abbot or prior, and *parochial*, when the charge of a secular priest.

Church, FREDERICK EDWIN (1826-1900), an American artist born in Hartford, Conn. He went to New York and in 1849 was elected a member of the National Academy. In 1853-1857 he traveled in South America. Later he went on an expedition to the coast of Labrador and on his return painted his great picture, *Icebergs*. He traveled through the West Indies, Europe and Palestine in 1866. His best work was the *Great Fall at Niagara*; other works are *Damascus*, *Jerusalem* and *The Parthenon*. Church's pictures are mostly pictorial, and they abound in details, to a fault, but they show care and skill.

Church'ill, RANDOLPH HENRY SPENCER, Lord (1849-1895), an English statesman, educated at Eton and at Oxford. He entered Parliament in 1874, and within ten years had risen to the position of a recognized leader of the Conservative party. In 1885 he was made secretary for India in Lord Salisbury's government, and the next year became chancellor of the exchequer. In 1886, after the defeat of the Gladstone Irish bill, which he opposed, Churchill became leader of the House of Commons.

Churchill, WINSTON (1871-), an American novelist, born in Saint Louis and educated at the United States Naval Academy at Annapolis. He was for a time editor of the *Army and Navy Journal*, and in 1895 he became

Churchill

managing editor of the *Cosmopolitan Magazine*. He has contributed short stories to leading magazines, and first gained wide popularity through his historical novels, *Richard Carvel*,



WINSTON CHURCHILL

The Crisis and *The Crossing*. In *Mr. Crewe's Career* and in *Coniston* he portrayed contemporary political life in New England. A later novel, *The Inside of the Cup*, deals with the relation of religion to social problems.

Churchill, WINSTON LEONARD SPENCER (1874–), an English statesman. He entered the army in 1895 and served in India, and then in Egypt. He took part in the Battle of Khartum, where he won a medal for gallant conduct. After serving during the Boer War as correspondent for the *London Morning Post*, he was elected to the House of Commons in 1900. He was then appointed Under Secretary of State for the Colonies, holding office two years. From 1908 to 1910 he was President of the Board of Trade; from 1910 to 1912, Home Secretary, and in 1912 he was appointed First Lord of the Admiralty in the Asquith ministry, being one of the youngest men who ever held this office. He has written *The River War*, *London to Ladysmith via Pretoria*, *My African Journey* and a biography of his father, Lord Randolph Churchill.

Churchill River, a river of Manitoba, Canada, which rises in La Crosse Lake, forms or

Cialdini

passes through various lakes or lake-like expansions, the largest being Big or Indian Lake, and enters Hudson Bay after a northeasterly course of about 900 miles. It is called also Missinippi, or English River.

Churn, a vessel used for preparing butter from cream or milk. The oldest and simplest pattern consisted of a vessel shaped like the lower part of a cone and having a circular hole in the center of the cover. The cream was agitated by the use of one or more small pieces of board containing a number of perforations and attached to a vertical handle, which extended through the opening in the cover. By working this handle up and down the motion was given to the cream or milk. Churns of a later pattern are now in general use and these secure the desired result by rotary motion. In creameries large churns operated by power are in use. See BUTTER; CREAMERY.

Churubusco, *choo'roo boos'ko*, BATTLE OF, a battle of the Mexican War, fought near the city of Mexico, August 20, 1847, between 18,000 Americans under General Taylor and 25,000 Mexicans under Santa Anna. The fighting was severe throughout one day, the Americans being at one time threatened with defeat, but a determined rally and counter-attack won an advantageous position, from which, by a concentrated fire, the Americans compelled the surrender of the fortress. The Mexicans retreated to the City of Mexico.

Chyle, *kile*, an opaque, milky fluid, found in the small intestines during digestion. It is formed by the action of the intestinal juices, bile and pancreatic juice, on chyme. These juices, being alkaline in character, neutralize the acidity of the gastric juice. Chyle contains the nutritive portion of the food, which is absorbed by the villi of the intestines and carried by the lacteals to the thoracic duct. See DIGESTION; LACTEALS; NUTRITION; STOMACH; THORACIC DUCT.

Cialdini, *chal de'ne*, ENRICO, Duke of Gaeta (1811–1892), an Italian soldier and politician. He was forced, on account of his share in the insurrection of 1831, to leave Italy, but he fought in the Austro-Italian War of 1849 and in the Crimea. For his defeat of the papal troops and his capture of Gaeta, he received the title of duke of Gaeta. He became general of the army and viceroy of Naples, was made senator and fought against the Austrians in the Seven Weeks' War. In 1876 he became ambassador at Paris.

Cibber, *si'b'bur*, COLLEY (1671–1757), an English dramatic writer and actor. His first dramatic effort, *Love's Last Shift*, appeared in 1695, and it was followed by *Woman's Wit*, the *Careless Husband* and the *Non-juror*. A court pension and his appointment as poet laureate drew upon him the rancor of the wits and poets of the day, including Pope, who ridiculed him in his new *Dunciad*. Cibber himself realized that the verses he wrote as laureate were worthless.

Cicada, *si ka'da*, a large insect, sometimes known as the *harvest fly*. It is one of the noisiest of insects, and in late summer it is heard in the trees making its peculiar rattling notes on the three drum-like membranes which are attached to the sides of its body and are operated by the wings. The females lay their eggs in the twigs of trees or shrubs, from which the young drop to the ground soon after they are hatched. The long life they live underground is not well understood, but finally the pupa crawls out upon the trunk of a tree or a spear of grass, its skin splits open along the back, and the full-grown insect emerges. At first the wings are merely watery sacs, but in a very short time they expand to their full size. The most remarkable of the cicadas is the so-called *seventeen-year locust*, whose larvae spend from thirteen to seventeen years under ground. Sometimes these are numerous enough to do great damage to vegetation.



CICADA

Cicely, *sis'e ly*, a popular name applied to several plants of the parsley family. Sweet cicely, or sweet chervil, is a plant common in Great Britain and other parts of Europe. It was formerly used in medicine, and in some parts of Europe it is used as an ingredient in soups. A species of sweet cicely is found in American woods from Canada to Virginia.

Cicero, *sis'e ro*, MARCUS TULLIUS (106–43 B. C.), the greatest Roman orator. His family was of equestrian rank. His father was a friend of some of the chief public men, and Cicero received the best education available. At the age of twenty-five he came forward as a pleader, and he soon won a most favorable reputation. In 79 B. C. he visited Greece and profited by the instruction of the masters of oratory. Here he formed that close friendship with Atticus of

which his letters furnished such interesting evidence. He also made a tour in Asia Minor and remained some time at Rhodes, where he visited the most distinguished orators and took part in their exercises. On his return to Rome his eloquence proved the value of his Grecian instruction, and he became one of the most distinguished orators in the forum. In 76 he was appointed quaestor of Sicily, and he behaved with such justice that the Sicilians gratefully remembered him and requested that he conduct their suit against their governor, Verres. He appeared against this powerful robber, and although only two of the seven Verrine orations were delivered, Verres went into voluntary exile. After this suit Cicero was elected aedile in 70, praetor in 67 and consul in 63. It was then that he succeeded in defeating the conspiracy of Catiline, after whose fall he received greater honors than had ever before been bestowed upon a Roman citizen. He was hailed as the savior of the State and the father of his country, and thanksgivings in his name were voted to the gods. But Cicero's fortune had now reached the culminating point. The conspirators who had been executed had not been sentenced according to law, and Cicero, as chief magistrate, was responsible for the irregularity. Publius Clodius, the tribune of the people, raised such a storm against him that he was obliged to go into exile. On the fall of the Clodian faction he was recalled to Rome, but he never succeeded in regaining the influence he had once possessed.

In 52 B. C. he became proconsul of Cilicia, a province which he administered with eminent success. As soon as his term of office had expired he returned to Rome, which was threatened with serious disturbances, owing to the rupture between Caesar and Pompey. He espoused the cause of Pompey, but after the Battle of Pharsalia he made his peace with Caesar, with whom he continued to all appearance friendly and by whom he was kindly treated. After the assassination of Caesar he hoped to regain his political influence. He allied himself with Octavianus and composed those admirable orations against Antony which are known as *Philippics* (after the speeches of Demosthenes against Philip of Macedon). Octavianus professed to entertain the most friendly feeling toward him, but when he had possessed himself of the consulate and formed an alliance with Antony and Lepidus, Cicero was proscribed. In endeavoring to escape from Tusculum, where he was living when the news of the proscription

arrived, he was overtaken and murdered by a party of soldiers.

Cicero's eloquence has always remained a model. After the revival of learning he was the most admired of the ancient writers, and the purity and elegance of his style will always place his works in the first rank of Roman classics.

Cid, *sid*, **THE**, an epithet applied to Ruy or Rodrigo Diaz, count of Bivar (1026?-1099), the national hero of Spain. He distinguished himself by his exploits in the reigns of Ferdinand, Sancho and Alphonso VI of Leon and Castile. His life appears to have been entirely spent in fierce warfare with the Moors, then masters of a great part of Spain. His sword, banner and drinking cup are supposed still to be in existence and are greatly revered by the Spanish people. Numerous romances in which history was mingled with the wildest fables were written about him during the sixteenth and seventeenth centuries, and he is the hero of a famous tragedy (*Le Cid*) by Corneille.

Cider, *si'dur*, a fermented liquor made from the juice of apples. The apples are ground and crushed until they are reduced to a pulp; the juice is allowed to run into casks, where it is freely exposed to the air until fermentation takes place, when a clear liquor of a pale brown or amber color is the result. Unfermented cider is extensively used as a beverage and is also boiled to the consistency of sirup and used in cooking. See **APPLE**; **VINEGAR**.

Cienfuegos, *the'ain fwa'gose*, a seaport of Cuba, on the south coast of the island, 130 mi. s. e. of Havana, with which it is connected by railway. It has a safe and capacious harbor on the Bay of Jagua. It is among the finest towns of Cuba and exports sugar, wax and timber to the value of over \$5,000,000 annually. Population in 1910, 70,416.

Cigar, *sig gahr'*, a small roll of manufactured tobacco leaves, intended to be smoked. It is lighted at one end and the smoke is drawn through it. The choicest cigars are those made in and imported from Havana. Good cigars are made in the United States and elsewhere. Medicated cigars, or cigars made of some substance having remedial properties, are often used for certain complaints, as stramonium cigars for asthma. *Cheroots* are peculiarly shaped cigars, much thicker at one end than the other, and are largely imported from Manila. (See **TOBACCO**).

Cilia, *sil'e a*, small, generally microscopic, hair-like projections found on the inner surface of some organs. These cilia have a constant

rapid motion, which produces a continuous current always in the same direction on the same surface. They are found in the nasal passages, except where the olfactory nerve is distributed, on the upper surface of the soft palate, in the Eustachian tube and the tympanum, in the larynx, except over the vocal cords, and in every tiny division of the bronchi. See **BRONCHI**; **LUNGS**.

Cilicia, *sil lish'i ah*, in ancient geography, a province of the southeastern part of Asia Minor, west of Syria. The chief city was Tarsus. The country was repeatedly invaded by Assyrian kings, but it was ruled over by native princes until conquered by Persia. Afterward, it was successively under Macedonian, Syrian and Roman dominion. The Cilicians of the coast were famous pirates who were much dreaded by other seafaring men.

Cimabue, *che'mah boo'a*, GIOVANNI (1240-1302), an Italian painter, born at Florence, the son of noble parents. Two Greek artists, who were invited to Florence to paint a chapel in the Church of Santa Maria Novella, were his first masters. Cimabue was the first of the artists of the Middle Ages to return to the classical ideals; he used the works of the ancient Greeks for models. His work, of which little now remains, may be considered the link between ancient and modern schools of painting. He is said to have discovered the talent of Giotto and to have instructed that artist. His drawing was very accurate, and the arrangement and natural expression of his figures was excellent, but the coloring was deficient. Cimabue's best paintings are in the Church of Santa Maria Novella at Florence and in Assisi. See **MADONNA**.

Cimbri, *sim'bre*, a tribe of ancient Europe, the origin of which is involved in obscurity. It is supposed that they were Celts and that *Cimbri* is the same as *Cymri*. See **CYMRI**.

Cimon, *si'mon*, (?-449 B. C.), an ancient Athenian general and statesman, the son of Miltiades. He fought against the Persians in the Battle of Salamis (480 B. C.), and he shared with Aristides the chief command of the fleet sent to Asia to deliver the Greek colonies from the Persian yoke. The greater part of his life was spent in the conflict with Persia.

Cinchona, *sin ko'na*, an important genus of plants belonging to the madder family. They are trees, shrubs or herbaceous plants, with simple opposite leaves and flowers arranged in panicles or corymbs. The fruit is dry or succulent. The plants are found almost exclusively in the

tropics, and many of the species are of great medicinal importance. The bark is taken off in strips, longitudinally; it is in time renewed by



CINCHONA

natural growth. Cinchona plants have been taken from Peru, their native home, and they are now cultivated in large plantations in Ceylon, India, Java and other tropical countries. See QUININE; PERUVIAN BARK.

Cincinnati, *sin'sin nah'ty*, OHIO, the county-seat of Hamilton county, the second city in population in Ohio and the thirteenth in the United States, is situated on the north bank of the Ohio River, opposite the Licking, 263 mi. s.w. of Cleveland, 270 mi. s. e. of Chicago, 764 mi. from New York, on the Baltimore & Ohio, the Big Four, the Pennsylvania, the Louisville & Nashville, the Queen & Crescent and other railroads, and on the Miami Canal. The city extends along the river for about 10 miles and northward from the river banks from 2 to 5 miles, the northern boundary being an almost unbroken east and west line. The river makes two prominent bends along the city front. Mill Creek, flowing into the Ohio from the north, divides the city into two unequal parts, the larger portion being on the east. Cincinnati is built upon a series of hills and slopes which rise from the river and are surrounded by a semicircle of bluffs, from whose summits a magnificent view of the city and its surrounding suburbs can be obtained. The surface of the city is quite irregular. The streets are well laid out and in

the main they cross one another at right angles; those running generally east and west in the lower part of the city are parallel with the river, but on the upper slopes they conform to absolute directions. The lower part of the city along the river banks is devoted to wholesale trade, freight warehouses and factories. On the middle slope are found the retail stores and most of the public buildings and business blocks. The highest slope is devoted to beautiful residences and numerous parks. Surrounding the city proper are a number of suburbs noted for their beauty and attractive residences. Among the most prominent of those in Ohio are Clifton, Avondale, College Hill and Walnut Hills, while across the river, in Kentucky, are Covington, Newport, Milldale, Bellevue and other less important villages. The river is crossed by five bridges. The truss bridge of the Cincinnati Southern Railway cost over \$3,348,000 and has one of the longest spans in the world; another is the wire suspension bridge extending to Covington, Ky., which was designed by John A. Roebling, the constructor of the Brooklyn Bridge, and was erected at a cost of \$1,800,000. All of the bridges are over a half mile long, and some of them, including their approaches, exceed a mile in extent. The city with its immediate suburbs in the two states contains a population of about 500,000.

Cincinnati has a complete school system, from the kindergarten training school to the university, under municipal government. Since 1905 there have been built a dozen new schools, costing from \$150,000 to \$225,000 each, and two new high schools costing \$750,000 each. The co-operative courses, part time courses, vocational and industrial classes give splendid opportunity for modern education. Besides the University of Cincinnati, with its observatory on Lookout Mountain (See CINCINNATI, UNIVERSITY OF), there are the Ohio Mechanics' Institute, Wesleyan Female College, Saint Joseph's and Saint Xavier's Jesuit colleges, Lane Theological Seminary, and the museum and art school in Eden Park. There is an excellent public library, occupying a building specially erected for it, besides law, historical and other libraries under the control of various organizations. There are numerous benevolent institutions maintained either by the city or by other organizations. Few cities can boast of better organized systems of charity.

Among the public buildings, the government building, containing the postoffice and custom-house and occupying the square bounded by

Cincinnati

Main, Walnut, Fifth and Patterson streets, is the most important structure. The county courthouse and the new city courthouse, the chamber of commerce, the Masonic Temple, Springer Music Hall, the arcade and public library are all structures worthy of mention for their size and the beauty of their architecture. The city contains many fine business blocks and a large number of churches. Among the latter, most worthy of note is Saint Peter's Cathedral, in Plum Street, between Seventh and Eighth, which is one of the best representatives of Grecian architecture in the city and has for the altarpiece Murillo's *Saint Peter Delivered*, one of the finest works of art in the country. Saint Xavier's church is a fine specimen of Gothic architecture. Saint Paul's Methodist, the First Presbyterian, the Baptist, the First Congregational, the Unitarian and the Hebrew Synagogue are also worthy of mention. The finest public work of art in the city is the Tyler-Davidson Fountain, in Fountain Square. This is of bronze and was cast in the royal foundry of Munich at a cost of \$200,000. The city also has an equestrian statue of President William Henry Harrison and statues of Garfield and Lincoln, and in Spring Grove Cemetery is a magnificent bronze statue erected in memory of the soldiers who fell in the Civil War.

Cincinnati contains a number of beautiful parks. The largest of these is Eden Park on Mount Adams, near the river. This contains the largest reservoir from which the city is supplied with water; it also has the art museum. Burnet Woods, in the northern part of the city, and the Zoological Garden, which has a very complete collection of wild animals, are other noteworthy parks. During the years 1909-1911 the city added to its park area over a thousand acres, nine municipal playgrounds, fully equipped, and fourteen playgrounds connected with the schools. The city and surrounding suburbs have many beautiful drives, many of which are noted for their shade trees and for the beautiful residences which they surround.

Cincinnati is an important commercial and railway center, being so located as to make it a convenient point of trans-shipment between the North and the South and to some extent between the East and the West. Regular lines of steamers ply between the city and New Orleans and intervening river ports, and numerous lines of railway radiate from it both to the Southern and Northern states. Because of this it has an extensive wholesale trade. It is also an impor-

Cincinnati

tant manufacturing center, maintaining over 8000 manufacturing establishments. Among the most important of the industries are slaughtering and pork packing, in which the city is second only to Chicago; manufactures of soap, distilled and malt liquors, furniture, carriages and wagons, boots and shoes, men's clothing, leather goods, brick, tile, cotton goods and various kinds of machinery and woodenware. The Rookwood Pottery Works are also located here and have attained a wide reputation for the excellence and beauty of their wares.

The site of the city of Cincinnati was first visited by George Rogers Clark in 1780; the first settlement was made in 1788, and the following year Fort Washington was built. In 1790 Hamilton County was organized, and Cincinnati became the county-seat. At this time it was given its present name by General Saint Clair, in honor of the Society of Cincinnati (See CINCINNATI, SOCIETY OF). In 1802 it was incorporated as a town, and in 1819 it was organized into a city. The city continued to increase in importance and population until the Civil War. Because of its intimate relation to the business interests of the South, the city as a whole was opposed to the anti-slavery movement, but at the breaking out of the war it stood firmly by the Federal government. In 1862 it was for a time under martial law. The city has suffered from frequent floods, which have caused much damage in the portion of the town next the river. In 1884 it was greatly disturbed by a riot, caused largely by the lax administration of justice. Population in 1910, 364,463.

Consult Ailes's *Cincinnati in Historic Towns of the Western States*.

Cincinnati, SOCIETY OF THE, a patriotic society organized by officers in the Continental army, while at Fishkill, on the Hudson River, May 13, 1783. Membership in the society was accorded to all Continental officers who had served three years or who had been honorably discharged, and also to the eldest male descendants of such officers. The society had thirteen branches, one in each of the original thirteen commonwealths, and its first meeting was held at Philadelphia in May, 1784. George Washington was the first president of the society. Owing to serious opposition to the purposes and methods of the organization, which were believed by many persons to be subversive of the principles of democracy upon which the new republic was organized, the Society of the Cincinnati soon declined in influence, and for many years after

Cincinnati

about 1830 it was practically dormant. In 1893, however, a revival began, and by 1902 all the old state societies were active.

Cincinnati, UNIVERSITY OF, an institution of higher learning at Cincinnati, Ohio, founded on bequests made by Charles McMicken in 1858, and by grants made subsequently by the city. The university was open for instruction in 1873. At present it comprises the following departments: the Academic, Graduate, Law and Medical departments; the Summer School and the College of Engineering. The Clinical and Pathological School of the Cincinnati Hospital and the Ohio College of Dental Surgery are affiliated with the university. The faculty numbers 200 and the student body over 1300. The productive funds of the university amount to \$3,500,000, and the library contains 70,000 volumes.

Cincinnatus, *sin'sin a'tus*, LUCIUS QUINTUS, a wealthy patrician of the early days of the Roman Republic. He violently opposed, during his consulship, the passage of the law for the equalization at law of patricians and plebeians. When, in 458 B. C., Minucius, the consul, was surrounded by the Aequians, the messengers of the Senate found Cincinnatus at work on his farm when they came to summon him to the dictatorship. He rescued the army from its peril, marched to Rome laden with spoil and then returned quietly to his farm. At the age of eighty he was again appointed dictator, to oppose the ambitious designs of Spurius Maelius.

Cineraria, *sin'e ra're ah*, a genus of plants consisting of herbs or small shrubs, with small-sized heads of flowers. They are chiefly found in South Africa. The name is derived from the lower leaves, which are of ashy appearance. A number of species are cultivated for garden purposes, and from these an almost endless variety of blossoms of many different colors have been evolved. Purple, red, and purple and white are the prevailing colors of these popular aster-like flowers.

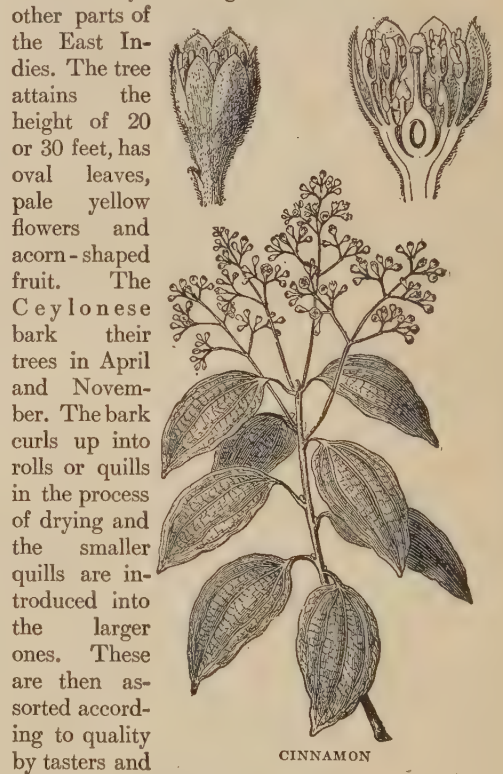
Cinna, *se'na*, LUCIUS CORNELIUS, an eminent Roman, an adherent of Marius. Obtaining the consulship in 87 B. C., after the expulsion of Marius from Rome, he impeached Sulla and endeavored to secure the recall of Marius. Driven from the city, he joined Marius and soon gained possession of Rome. The friends of Sulla were massacred, and Cinna and Marius made themselves consuls, 86 B. C. After the death of Marius the army refused to follow

Circassia

Cinna against Sulla and put him to death in 84 B. C.

Cinnabar, *sin'na bahr*, red sulphide of mercury, the principal ore from which that metal is obtained, occurring abundantly in Spain, California, China and other countries (See MERCURY). It is of a cochineal red color, and it is used as a paint under the name *vermilion*.

Cinnamon, *sin'na mon*, the bark of the under branches of a species of laurel, which is chiefly found in Ceylon, but grows also in Malabar and other parts of the East Indies. The tree attains the height of 20 or 30 feet, has oval leaves, pale yellow flowers and acorn-shaped fruit. The Ceylonese bark their trees in April and November. The bark curls up into rolls or quills in the process of drying and the smaller quills are introduced into the larger ones. These are then assorted according to quality by tasters and

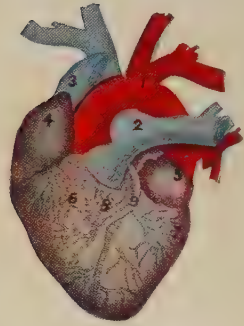
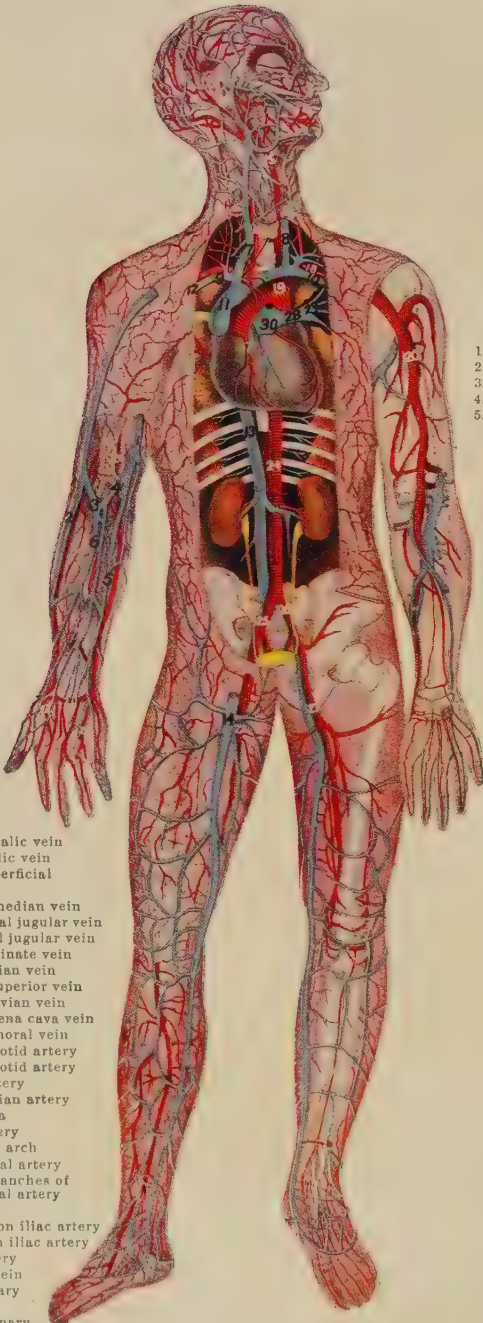


are made up into bundles. An oil of cinnamon is prepared in Ceylon, but the oil of cassia is generally substituted for it; indeed, the cassia bark is often substituted for cinnamon, to which it has some resemblance, although in its qualities it is much weaker. The leaves, the fruit and the root of the cinnamon plant all yield oil of considerable value; that from the fruit, being highly fragrant and of thick consistence, was formerly made into candles for the sole use of the king of Ceylon.

Circassia, *sir kash'e ah*, or **Tcherkessia**, a mountainous region in the southeast of European Russia, in the northwestern Caucasus, bounded on the w. by the Black Sea, on the n.

Veins and Arteries

1. Basilic vein
2. Superficial radial vein
3. Median cephalic vein
4. Median basilic vein
5. Anterior superficial ulnar vein
6. Superficial median vein
7. Right internal jugular vein
8. Left internal jugular vein
9. Right innominate vein
10. Left subclavian vein
11. Vena cava superior vein
12. Right subclavian vein
13. Ascending vena cava vein
14. Common femoral vein
15. External carotid artery
16. Common carotid artery
17. Coronary artery
18. Left subclavian artery
19. Arch of aorta
20. Brachial artery
21. Deep palmar arch
22. Palmar digital artery
23. Collateral branches of palmar digital artery
24. Aorta
25. Right common iliac artery
26. Left common iliac artery
27. Femoral artery
28. Pulmonary vein
29. Left pulmonary vein
30. Right pulmonary vein



External View of the Heart

- | | |
|-------------------------|-------------------------|
| 1. Aorta | 6. Right ventricle |
| 2. Pulmonary artery | 7. Left ventricle |
| 3. Descending vena cava | 8. Left coronary artery |
| 4. Right auricle | 9. Left coronary vein |
| 5. Left auricle | |



Scheme of the Circulation

- | | |
|-------------------------------|--------------------------|
| 1. Heart | 10. Pulmonary artery |
| 2. Lung | 11. Ascending vena cava |
| 3. Head and upper extremities | 12. Descending vena cava |
| 4. Spleen | 13. Pulmonary vein |
| 5. Intestine | 14. Portal vein |
| 6. Kidneys | 15. Carotid artery |
| 7. Lower extremities | 16. Lacteals |
| 8. Liver and portal vein | 17. Thoracic duct |
| 9. Aorta | |

Plate used by permission of the Caxton Company, Chicago

CIRCULATION OF THE BLOOD

by the Kuban River, on the s. by Mingrelia and on the e. by the country of the Lesghians. The mountains, of which the culminating heights are those of Mount Elbruz, are intersected everywhere with steep ravines and are clothed with thick forests; the territory is principally drained by the Kuban and its tributaries. In 1829 the country was formally annexed by Russia. A heroic resistance was made by the Circassians under their leader, Schamyl, and it was only after a struggle of thirty-five years that Russian rule was established. On being reduced to submission, numbers of the inhabitants emigrated to the Turkish provinces. In the north and east, however, tribes of the Circassian stock remain.

Circassians, the name applied to the people who inhabit the region of the Caucasus, and particularly to the Adighe, or Tcherkesses. Other tribes are the Abkhasians on the Black Sea, and the Kabardians, living around the valleys of the Kuban and Terek. The Circassians are dark-skinned, and both the men and women are noted for their great physical beauty, the women often being sold into the Turkish and Persian harems. The men are active, sturdy and courageous and showed their spirit of independence during the Russian conquest, which was completed in 1864, when more than three hundred thousand Circassians left for various parts of Turkish provinces, after a brave struggle for liberty. Those who remain in the original home number about 150,000. The religion of the higher classes is Mohammedanism, but the lower classes have adopted a religion which is a combination of Christianity and Mohammedanism.

Circe, *sur'se*, a fabled sorceress of Greek mythology, who lived in the island of Aeaëa, represented by Homer as having converted the companions of Ulysses into swine, after having caused them to partake of an enchanted beverage. Ulysses, under the guidance of Mercury, resisted her enchantments and compelled her to restore his companions.

Circle, *sur'k'l*, a plane figure contained by one line, called the *circumference*, which is so drawn that all its points are equally distant from a certain point within, called the *center*. The *diameter* of the circle is a line drawn through the center and terminating at the circumference. The *radius* is one-half the diameter. A *great circle* is one on a sphere, whose center coincides with that of the sphere. All other circles on a sphere are *small circles*. The famous problem

of "squaring the circle," which is to find the area of a circle having given only the radius, is impossible of solution, since it requires that the exact ratio between the radius and the circumference be found; but this ratio is an indeterminate number, approximately equal to 3.1415926535. To find the approximate area of a circle, multiply the square of the radius by this number, which is known as *pi* (π). For the purpose of measuring angles, the circle is divided into 360 *degrees*, each degree into 60 *minutes* and each minute into 60 *seconds*, an angle being measured by the number of degrees on the circumference of a circle included between its sides, when its vertex is at the center. The circle is one of the conic sections (See CONIC SECTIONS), and it is a curve of the second order (See CURVE).

Circleville, OHIO, the county-seat of Pickaway co., 30 mi. s. of Columbus, on the Scioto River, the Ohio & Erie Canal and on the Cincinnati & Muskingum Valley and the Norfolk & Western railroads. The city was settled in 1806 and takes its name from its location on the site of a circular earthwork, built by some prehistoric people. It contains packing houses, flour mills and manufactures of straw board, furniture, farm implements and other articles. Population in 1910, 6744.

Circuit Courts. See COURTS.

Circulation, the flowing of blood through the blood vessels. Although Galen, who had observed the opposite directions of the blood in the arteries and veins, may be said to have been upon the very point of discovering the circulation, William Harvey in 1628 pointed out the connections between the heart, arteries and veins, the reverse directions taken by the blood in the different vessels, the arrangements of valves in the heart and veins so that the blood could flow only in one direction, and the necessity of the return of a large proportion of blood to the heart to maintain the supply. In 1661 Malpighi with a microscope examined the circulation in the web of a frog's foot and showed that the blood passed from arteries to veins by capillaries. Arterial blood leaves the left ventricle of the heart, flowing through the aorta and its branches, which carry it to all parts of the body except the lungs. It passes through the capillaries, giving up oxygen and taking carbonic acid, then through the veins, returning to the heart through two large veins that pour their contents into the right auricle of the heart. This auricle contracts, forcing the

blood into the right ventricle, which in turn forces it into arteries, that carry it to the lungs, where it gives up carbonic acid and receives oxygen. Four pulmonary veins carry the blood from the lungs to the left auricle, which forces it into the left ventricle, whence we commenced to trace it. The circulation from the right side of the heart through the lungs to the left side of the heart is called the *pulmonary circulation*, and that from the left side of the heart through the body to the right side, the *systemic circulation*. A portion of the blood in the intestines is carried through the portal vein to the liver, where, after passing through a fine network of capillaries, it is carried through the hepatic veins to one of the large veins of the systemic circulation. This is called the *portal circulation*. Any part of the blood will make the circuit of the system in about twenty-three seconds, and the whole amount of the blood passes through the heart in about thirty-seven and one-half seconds. The weight of the blood is about one-twelfth the weight of the body in an adult. The forces that propel the blood are the contraction of the heart; the contraction of the muscles, which produces pressure on the veins; the act of breathing; the action of the valves in the heart and arteries. See AORTA; ARTERIES; CAPILLARIES; HEART; VEINS.

Cir'cus, among the Romans, a nearly oblong building without a roof, in which public chariot races, exhibitions of pugilism and wrestling and other games took place. It was rectangular, except that one short side formed a half-circle; on both sides and on the semicircular end were the seats of the spectators, in tiers sloping backwards. On the outside the circus was surrounded with colonnades, galleries, shops and public places. There were eight or ten circuses at Rome, of which the largest was the Circus Maximus, 1875 feet long and 625 feet wide, capable, according to Pliny, of containing 260,000, and according to Aurelius Victor, 385,000, spectators. At present, however, but few vestiges of it remain, and the Circus of Caracalla is in the best preservation. The games celebrated in these structures were known collectively by the name of *circensian* games, or games of the circus, which under the emperors attained great importance and magnificence. The principal games of the circus were the Roman, or Great, Games, which were celebrated from September 4 to 14, in honor of the great gods. The festival was opened by a splendid procession, or *pompa*, in which the

magistrates, Senate, priests, augurs, vestal virgins and athletea took part, carrying with them the images of the great gods, the Sibylline Books and sometimes the spoils of war. On reaching the circus the procession went round once in a circle, the sacrifices were performed, the spectators took their places and the games commenced. These were: 1, Races with horses and chariots, in which men of the highest rank engaged. 2, Gymnastic contests. 3, The Trojan games, prize contests on horseback, revived by Julius Caesar. 4, Combats with wild beasts, in which beasts fought with beasts or with men, criminals or volunteers, an exhibition which was especially attractive to the Romans. Under the Empire this kind of show was transferred to the amphitheater. 5, Representations of naval engagements, for which purpose the circus could be laid under water. The expense of these games was often immense. Pompey, in his second consulship, brought forward 500 lions at one combat of wild beasts, which, with eighteen elephants, were slain in five days. These shows were free to the people, and their love for them appears from the cry with which they addressed their rulers: "Bread and the games."

The modern circus is a place where animals are trained to perform antics, and where exhibitions of acrobats and various pageantries, including a large amount of buffoonery, are presented for the amusement of the spectators. This form of amusement has become especially popular in the United States, where it has attained immense proportions (See BARNUM, PHINEAS TAYLOR).

Cisalpine, sis al'pin, Republic, a state founded by Bonaparte in 1797 in northern Italy. It included Lombardy, Mantua, Verona, Cremona, Brescia, Bergamo, Rovigo, the Duchy of Modena, Massa, Carrara, Bologna, Ferrara and the Romagna, and it had in all an area of over 16,000 square miles and a population of 3,500,000. Austria recognized the Republic in the Treaty of Campo Formio, but the new state was dissolved in 1799 by the victories of the Austrians and Russians. It was regained by Napoleon Bonaparte in 1800, took the name of the "Italian Republic" in 1802 and elected Bonaparte as president. Three years later it became the "Kingdom of Italy," with Napoleon as king, and it continued as such until 1814.

Cistercians, an order of monks, a branch of the Benedictines founded by Robert, abbot of Molseme, in 1098. The habit

was white with a black scapular. The rules of the order were very strict, and for the first century of its existence it included only a few members. Early in the thirteenth century it was joined by Saint Bernard and thirty followers, and from that time on it grew rapidly. By the middle of the fourteenth century there were 700 abbeys located in France, Ireland, Spain, Portugal, Norway, Sweden and Germany. In recent times the order has declined, and there are now only a few abbeys. At the time of their greatest prosperity the Cistercians were much interested in literature and art and collected many manuscripts for their libraries. Their churches were distinguished by their simplicity and had no paintings or sculpture; but it is to them that the beginning of Gothic architecture may be traced (See ARCHITECTURE, subhead *Gothic Architecture*). The nuns of Saint Royal, the Feuillants, or barefooted monks, and the Trappists are branches of the Cistercians.

Cistern, *sis'turn*, a large tank, either above or below ground, for holding water. Cisterns may be made of wooden staves held together by hoops of iron, galvanized iron or other sheet-metal; they are also frequently made by lining the walls of an excavation in the ground with brick or cement. Cisterns are used for storing water in localities where the inhabitants have to depend upon rain water for domestic purposes, and oftentimes by railroads for supplying their locomotives. When cistern water is used for drinking purposes, it is necessary to filter it. See FILTER.

Cities of Refuge, six out of the forty-eight cities given to the tribe of Levi in the division of Canaan, set apart by the law of Moses as places of refuge for the manslayer or accidental homicide. Their names were Kedesh, Shechem and Hebron, on the west side of Jordan; and Bezer, Ramoth-Gilead and Golan, on the east. No part of Palestine was far from a City of Refuge. The manslayer fled to the nearest one, where he was given a fair trial and if not guilty of willful murder could remain in the city till the death of the high priest, when he was at liberty to go to his home.

Cit'izen, a member of an organized political society. Originally, a citizen was any one entitled to share in the management of a city-state, but gradually the limits of citizenship have been extended until now, in modern republics, almost every resident is a citizen. In the monarchies of Europe the term is used to

denote a resident of a municipality, the citizen's relations to the state being expressed by the word *subject*. In the United States a citizen is one who owes allegiance and support to the government and is entitled to its protection; it includes women, children, criminals, persons of all races, except alien residents and indians living still under tribal authority. Citizens are of two classes, *natural-born*, that is, persons born within the jurisdiction of the United States, and *naturalized*, that is, persons who have taken certain legal steps to renounce a former allegiance and adopt a new one (See NATURALIZATION). In the United States, practically, a citizen of a state is a citizen of the United States, and *vice versa*, but an exception exists in the case of the residents of the territories, who are citizens of the United States, but not of any particular state. The Civil War decided, as far as war could decide, that in case of resistance of a state to the nation, the citizen owes allegiance first to the latter. Citizenship does not imply the right to vote, for the latter may be withheld or granted to classes or individuals at the will of the state.

Citric, *si'trik*, **Acid**, the acid of lemons, limes and some other fruits. It is generally prepared from lemon juice, and when pure it is white, inodorous and extremely sharp in its taste. In combination with metals it forms crystalline salts, known as citrates. The acid is used to prevent the formation of colors not wanted in calico printing, and it is also used as a substitute for lemon juice in making beverages.

Cit'ron, a large, sour fruit, much like a lemon, but scarcely edible, unless preserved in sugar. The citron tree has been a favorite in Europe since the days of the ancient Greeks, because of its handsome fruit and blossom. In the United States the name citron is also given to a small, hard watermelon that is used for pickles and preserves.

Cit'rus, an important genus of plants that includes the orange, citron, lemon, lime, grapefruit and other fruit trees and shrubs, all of which are described in this work under their common names. The citrus plants have rather long, pointed leaves or leaflets, united by a distinct joint to the leaf-like stalk; their stamens are united by their filaments into several irregular bundles, and they have pulpy fruits with spongy rinds.

Cit'y, in a general sense, a large town, usually holding a leading position in the community in which it is situated. In Europe, especially

England, the term is sometimes applied to a town which is or has been the see of a bishop. This use of the name, however, has now been generally superseded by the wider one given above. The name, derived from a Greek root, originally signified more nearly *state* than *city*, but from the fact that the ancient states were largely coincident in territory and character with communities agreeing almost perfectly with the modern conception of the city, the modern meaning of the word has arisen. Examples of the ancient *city* existed even in comparatively modern times in the so-called city-states of Italy, and they still exist in a modified form in the free cities of Germany and in some of the cantons of Switzerland, which practically consist of single cities and their outlying districts. In the United States the term is technically applied to a town having certain powers granted by a special act of incorporation and usually having a mayor as its executive head.

One of the peculiar developments of modern times is the centralization of population in cities. Consequently there have arisen certain striking characteristics of city life. The city has become the center of culture and commerce, but at the same time it is the center of poverty and degradation. It is therefore the breeding place of class antagonism, of criminal influence and of disease. Side by side with these developments have arisen problems which constitute some of the most important social, economic and political questions of the time. See MUNICIPAL GOVERNMENT.

Ciudad Bolívar, *se oo dahd' bo le'vahr*, a city of Venezuela and capital of the province of Bolívar, situated on the Orinoco River about 240 mi. from the sea. The site is low, being only 185 feet above sea level. The city contains a number of large, handsome buildings, including the cathedral, a theater, market and college. The chief export is coffee, but rubber, sugar, asphalt, cattle and hides are also exported. The town ranks among the four largest ports of Venezuela. Previous to 1819 it was known as Angostura. Population, 11,700.

Ciudad Real, *the oo dahd' ra ahl'* (royal city), a town of Spain, capital of the province of the same name, on a low plain near the Guadiana, 100 mi. s. of Madrid. The principal edifice is the Church of Santa Maria, a magnificent Gothic structure. The manufactures consist of woolens, linen, olive oil, flour and leather. Population in 1911, about 16,000.

Civet, *siv'et*, or **Civet Cat**, an animal resembling both the weasel and the fox, found in North Africa and in Asia from Arabia to Malabar and Java. It is from two or three feet long and ten inches high, is of a grayish color, tinged with yellow and marked by dusky spots in rows. Civets prey upon birds and small animals and feed by night. At one time they were much hunted because of the perfume obtained from them.

Civ'il Law, among the Romans, the term nearly corresponding to what in modern times is implied by the phrase *positive law*, that is, the rules established by any government. They distinguished it from natural law (*jus naturale*), or the law followed by all living beings, and from laws of mankind established by the agreement of all governments (*jus gentium*). It included both the private law (*jus privatum*), which relates to the various legal relations of the citizens, and the public law (*jus publicum*), the rules respecting the limits, rights and obligations of the governments. The final digest of Roman law was made in the sixth century A. D., under the emperor Justinian. As the Roman code exerted the greatest influence on modern Europe, the expression *civil law* is used to embrace all the rules relating to the private rights of citizens; for example, in Germany, *Das gemeine deutsche Privatrecht*; in France, the *Code Napoleon*. In this sense it is chiefly opposed to *criminal law*, particularly in reference to the administration of justice, which is to be divided into *civil justice* and *criminal justice*. See PROCEDURE.

Civil Service and Civil Service Reform. Under the head *civil service* are classed all officers who do not belong to the military or naval service, but are engaged in the administration of the civil affairs of a state, such as the collection of revenue, performance of executive duties of the government and representation of the country abroad. The administration of such affairs calls always for attentive, unbiased, business-like action, and often for expert knowledge and skill. Its success depends upon its being done with regard only for the public interests. With the development of party organizations and interests in the United States, however, there early grew up a feeling of loyalty to party, which soon trammelled public officials in the execution of their duties, by influencing them to consult party and personal friendships in the appointments at their command. This feeling led to the frank admission, during Jack-

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son's term of the principle that "to the victors belong the spoils" of office. From that time, the evil of party appointments and office-seeking grew steadily in its proportions, until by 1870 it had undermined the efficiency of government administration.

In 1840 Horace Greeley wrote from Washington: "We have nothing new here in politics, but large and numerous swarms of office-hunting locusts sweeping into Washington daily; all the rotten land speculators, broken bank directors, swindling cashiers, etc., are in full cry for office, office; and even so humble a man as I am is run down by letters, letters."

General Grant, in 1872, undertook to suppress the evil, and, with the consent of Congress, he appointed a commission to make rules and regulations for admission to and continuance in the civil service. The rules reported, however, by this commission were never carried out to any considerable extent, on account of the political pressure which was brought to bear on the members of Congress. President Hayes undertook to carry out Grant's plan, and a reform was instituted in several of the large postoffices of the country. In January, 1883, Congress authorized the president to appoint, with the advice and consent of the Senate, three civil service commissioners, whose duty was to aid the president in preparing suitable rules providing for open, competitive examinations for testing the fitness of applicants for the public service, such examinations to be practical in their character, and, so far as might be, to relate to those matters which would fairly test the relative capacity and fitness of the persons examined, to discharge the duties of the service. This commission is still in existence. All the offices, places and employments are arranged in certain classes to be filled by selection, according to grade, from among those ranked highest as the result of competitive examination. Appointments to the public service in the departments at Washington are to be apportioned upon the basis of population to the several states. The law provides that all persons in the public service shall be exempted from any obligation to contribute to any political fund or to render any political service. It forbids any person in the public service using his official authority to coerce the political action of any other person or body. Power is given to the Civil Service Commission to make regulations for, and to have control of, all examinations, subject to the rules made by the presi-

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dent. Provision is made for holding examinations at convenient places in every state and territory of the Union. The commission may punish by fine and imprisonment all in the public service who willfully defeat, obstruct or deceive any person in respect to his right of examination, or who shall corruptly or falsely mark, grade, estimate or report upon the proper standing of any person examined, or who shall furnish to any person any special or secret information for the purpose of either improving or injuring the prospects of any person so examined for being appointed, employed or promoted. It further provides that no person in the habit of using intoxicating liquors is to be appointed to, or retained in, offices to which the act applies. Besides the qualifications which an applicant must disclose in his examination, certain other rules have been laid down to govern the appointment of subordinate officers. Among them are the following:

Applicants for examination must be citizens of the United States of the proper age. No discrimination is made on account of sex, color or political or religious opinions. The limitations of age vary with the different services; but the age limitations do not apply to any person honorably discharged from the military or naval service of the United States by reason of disability resulting from wounds or sickness incurred in the line of duty.

Blanks of application for offices in the departments in the Railway Mail, Indian School or Government Printing Office service should be requested directly of the Civil Service Commission at Washington. The blank for the Customs, Postal or Internal Revenue service must be requested in writing by the persons desiring examination of the Customs, Postal or Internal Revenue Board of Examiners, at the office where service is sought.

The service classified under the act, and that to which it and the rules apply, embraces employes in all grades from janitors to assistants in government departments; clerks of all special commissions, such as the Interstate Commerce Commission, or the Fish Commission; all such branches of special service as lighthouse and life-saving; engineers; draughtsmen; firemen; in fact, practically all civil officers who are not appointed subject to the approval of the Senate. The offices under the classified service number, all told, over 400,000, including the unclassified employes of the Isthmian Canal Commission.

The applicants are examined as to their

relative capacity and fitness. The ordinary clerical examinations are used only for clerkships requiring no particular information or skill. They are limited to the following subjects: First, orthography: penmanship and copying; second, arithmetic: fundamental rules, fractions and percentage; third, interest and discount, elements of bookkeeping, and accounts; fourth, elements of the English language, letter writing and the proper construction of sentences. For places in which a lower degree of education suffices, as for compositors and other trade employees, the Commission omits the third, and parts of the fourth, subject. The examinations relate as nearly as possible to the duties to be performed, and wherever practicable include experience and practical tests. No one is certified for appointment whose standing in the examination is less than 70 per cent of complete proficiency, except that applicants claiming military or naval preference need obtain but 65 per cent. The law also prescribes competitive examinations to test the fitness of persons in the service for promotion therein. The Commission gives a certificate to the person examined, stating whether he passed or failed to pass.

CIVIL SERVICE IN CITIES. Civil service in the large cities is now, to a considerable extent, under laws similar to those described above. The most marked effect of these laws in the cities has been to relieve the mayors and heads of departments from much of the pressure of applicants for office, thus leaving them more free to attend to their important public duties. It has also relieved city employes from the unfair burden of political assessment. No officer or employe can solicit or receive pay, or be in any manner concerned in soliciting, receiving or paying any assessment, subscription or contribution for any party or political purpose whatever. Applications for admission to examination are made on blanks in a definite form and manner, and they are supported by such certificates of persons acquainted with the applicant as may be prescribed. Blanks for such applications are furnished by the local civil service commission.

All competitors who attain a general average of 70 per cent or over in examination are eligible for appointment, and their names are enrolled in the order of general average upon proper registers. The names remain upon the register of eligibles for two years from date of enrollment. Any person whose name is on the register of eligibles may accept temporary appoint-

ment without losing his position on the register of eligibles. All promotion in the civil service, unless otherwise provided, is from grade to grade, and it is made upon voluntary, open, competitive examinations. Comprehensive civil service laws applying to both state and city governments have been enacted in several states. Wisconsin has a law applying to the entire state service.

The civil service method of appointment does not always result in placing the most competent in office, but it does result, when conscientiously administered, in the exclusion of the absolutely unfit, and it has effected a vast improvement in the public service of the United States, and has freed the national government from many of the ills of party patronage. In fact, its failings probably result more from the still powerful influence of party organizations and the consequent partial enforcement of the law, than from weakness in the principle or details of the civil service reform laws as they stand.

Civil War in America, the great struggle from 1861 to 1865 between the Southern and the Northern states of the Union. (For a somewhat detailed discussion of the causes of the conflict, see articles on the UNITED STATES OF AMERICA, subhead *History*; NULLIFICATION; STATES' RIGHTS; CONFEDERATE STATES OF AMERICA; SLAVERY. For the political events contemporary with the war, see articles upon the chief civil leaders and, also, CONFEDERATE STATES OF AMERICA; UNITED STATES OF AMERICA, subhead *History*). The fundamental cause of the war was the growth of the institution of slavery in the South, after it had long been practically abolished in the North. This led to important differences of economic and political opinion and, especially, to the emphasis in the South of the principle of states' rights. The natural outgrowth of such a belief was the doctrine of secession, and this was ultimately adopted. Between December 20, 1860, and February 1, 1861, the seven states of South Carolina, Mississippi, Florida, Alabama, Georgia, Louisiana and Texas passed ordinances of secession. On February 4, the government of the Confederate States of America was organized, and by July four other states, Virginia, North Carolina, Tennessee and Arkansas, had joined this new union.

In spite of numerous attempts at compromise, the war was meantime opened by the seizure on the part of Southern states of United States forts and arsenals, a step which had been made

easy by the Southern sympathies of members of Buchanan's cabinet. The first gun was fired at Fort Sumter, in the harbor of Charleston, S. C. (See FORT SUMTER), on April 12, 1861, and the fort surrendered on the same day. Immediately after this event (April 15), President Lincoln called for 75,000 volunteers and declared the coast of the Southern states to be under blockade. The Confederacy also issued a call for volunteers and retaliated for the blockade by issuing letters of marque and reprisal.

The border states of Missouri, Kentucky, Maryland and Delaware were of immense importance to both parties, and steps were immediately taken to secure control of them. They at first remained neutral, but they later joined the Union cause.

The first real military movements of the war occurred in the western part of Virginia, each government desiring to hold this territory as a buffer against the operations of the other. The Confederates were soon driven from the region by General McClellan. The next important event was the first Battle of Bull Run, which resulted from an attempt on the part of General Irving McDowell to begin a campaign for the capture of Virginia. It resulted in a disastrous Federal defeat. Thereafter, General McClellan was called from West Virginia to take charge of the Federal troops, but he occupied the remainder of the year in increasing, drilling and equipping his force. A Federal force under Benjamin F. Butler suffered an important defeat at Big Bethel, and another force was almost completely destroyed at Ball's Bluff. Meantime, the State of Missouri was being saved to the Union by the activity of General Lyon, and in spite of a severe defeat at Wilson's Creek, in which Lyon was killed, the Federals under General Curtis drove the Confederates from the territory.

The year 1862 opened with rather gloomy prospects for the Union. The military situation improved in the spring, however, and at Mill Spring a decisive victory for the Federals under Thomas practically cleared Kentucky of Con-

federate soldiers. In February a Union force under General Grant, with the aid of a river fleet under Commodore Foote, captured Forts Henry and Donelson, with about 15,000 prisoners and vast amounts of ammunition, artillery and supplies. In April occurred the Battle of Shiloh, in which, after a terrible struggle, the Federals under Grant were victorious, and the able Confederate general, A. S. Johnston, was killed. A few days after the Battle of Shiloh the Federals occupied Corinth, an important strategic position. Late in the same month a large Union force under General Butler, ably assisted by Admiral Farragut with a fleet, reduced the forts guarding New Orleans and took possession of



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the city. About the same time, General Polk and Commodore Foote were capturing the important Confederate position on Island No. 10. It was during the month of March of this year, also, that the famous battle between the *Monitor* and the *Merrimac* (renamed the *Virginia*) occurred in Hampton Roads.

In the early spring of 1862, General McClellan, with the Army of the Potomac, undertook the first general land campaign of the war, in an effort to fight his way to Richmond and capture the city, which had been made the Confederate capital. After a campaign lasting for more than four months, of which the last month witnessed almost continuous fighting, the Federals were compelled to abandon the project, leaving Lee,

the great Confederate chieftain, in practical control of the state of Virginia. Another campaign to the same end was immediately undertaken by General Pope; but on August 30, at the old battlefield of Bull Run, the Confederates won another hard-earned but complete triumph. After the second Battle of Bull Run, Lee determined upon a bold invasion of the North, in order to gain the border state of Maryland and to win a victory in the enemy's country, in the hope of making that victory the basis of terms of peace. He advanced into Maryland without serious opposition, but was overtaken at South Mountain, September 14, where a determined battle raged for a few hours. On the following day another fierce conflict was fought near Sharpsburg on Antietam Creek, and as a result Lee was compelled to retreat into Virginia and abandon his projected invasion. However, the Union army, besides its losses in battle, lost 12,000 men who had been captured by "Stonewall" Jackson at Harper's Ferry.

After Antietam, McClellan, on account of his dilatory tactics, was superseded as commander of the Army of the Potomac by General Burnside. The army fought but one battle under its new commander. This was at Fredericksburg, where the Federals attacked a strong Confederate position and suffered terrible slaughter without gaining any advantage. Meanwhile, in the west the Confederates had made determined efforts to regain Kentucky and Tennessee. General Bragg, with about 45,000 men, had marched into the state, occupying important positions, but was defeated at Perryville by General Buell and compelled to retreat, while Rosecrans had repulsed a determined attack by Van Dorn at Corinth. Rosecrans succeeded Buell as commander of the Army of the Cumberland, and on the last day of the year he met Bragg's army, which had returned to Tennessee, at Murfreesboro. After a terrific three days' battle the Confederates retreated.

The year 1863 witnessed the crucial campaigns of the struggle, the turning point of the war. In the

east, Burnside was succeeded by Joseph Hooker. At Chancellorsville Lee inflicted on Hooker a terrible defeat, and the victories at Chancellorsville and Fredericksburg encouraged Lee to make another invasion of the Northern states. The two armies therefore advanced northward on opposite sides of the Blue Ridge, each hastening to be the first to cross the Potomac. Just before the crucial point of this campaign, Hooker was relieved and Meade was placed in command of the Federal army. He immediately crossed the Potomac and harassed Lee until he was forced to give battle. This was at Gettysburg on July 1 to 4, where, after one of the most



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important combats of modern times, the Confederate advance was checked. This Federal victory was almost duplicated on exactly the same day at Vicksburg in the southwest, where U. S. Grant had been conducting a long siege and bombardment. The Confederate General Pemberton surrendered on July 4. In the same month, Port Hudson surrendered to General Banks, and within a few weeks the Mississippi River was freed from Confederate control. The year of 1863 witnessed important events in the states of Kentucky and Tennessee. First was the Battle of Chickamauga, in which the Federal Army of the Cumberland under Rosecrans was almost completely destroyed by the Confederates

under Bragg. Soon afterwards, Grant became head of the Department of the Mississippi, which included all the western armies, and in November he directed the great Battles of Chattanooga, including the celebrated "Battle above the Clouds" and the gallant storming of Missionary Ridge, by which the Confederates were completely routed.

In the following spring, Ulysses S. Grant, who had displayed remarkable ability in the west, was made commander in chief of all the armies of the Union and took personal charge of the Army of the Potomac in Virginia. Under his direction an army of 100,000 men under General Sherman was to advance from Chattanooga to Atlanta and, if possible, crush the army of General Joseph E. Johnston, while the Army of the Potomac was to proceed toward Richmond and capture or destroy the famous Army of Northern Virginia under Lee. The advance was begun May 4. The first battle in the east was on May 5, in the so-called Wilderness, just south of the Rapidan River. Neither side gained a decisive victory. Grant continued his movement by ordering a march around Lee's right flank, but was again confronted at Spottsylvania Court House by Lee's whole army and was defeated in his purpose to crush that force. Again taking up the movement about the enemy's right, he was compelled to give battle at the North Anna River, but was again defeated and for the third time made a circuitous march to the left about Lee's position. At Cold Harbor the two armies again met, and after probably the most stubborn contest of the whole war Grant withdrew and attempted by his usual methods to advance towards Richmond. At Petersburg he was brought to an abrupt halt and was compelled to begin a siege, lasting nearly a year. Meantime, in the Shenandoah Valley, the Confederates under Early had threatened Washington and had made costly raids upon Northern towns, but in the summer of 1864 they were driven from the valley by Federal cavalry under Sheridan. During this summer General Sherman was carrying out his

part of the general campaign, advancing slowly but steadily toward the important city of Atlanta, against a brilliant resistance by General Joseph Johnston. Johnston was superseded, however, just as Sherman's campaign was drawing to a close, by General Hood. He was unable to stop the advance, and Sherman entered Atlanta, September 2. It was two months later that he left Atlanta and began his march to the sea, during which he destroyed everything of value in a strip sixty miles wide. He occupied the city of Savannah on Christmas day. Meantime, General Hood had hoped to draw him from this operation by making a counter movement toward the north. Sherman dispatched Thomas to defend the State of Tennessee, and he did it



SHERMAN'S MARCHES

admirably. Occupying Nashville, he awaited the approach of the Confederate force until December 15, when he opened a battle which resulted in the complete destruction of the Confederate army, the 15,000 survivors never being reorganized. On the sea the Union cause was also victorious during this year, the *Alabama*, the most conspicuous of the Confederate privateers, being sunk by the United States corvette *Kearsarge*, in the harbor of Cherbourg, France. In Mobile Bay another daring feat had been placed to the credit of the American navy, Rear Admiral Farragut being the hero of the occasion.

The successes of the Union arms during 1864 were to culminate in the early spring in the complete defeat of the Confederate cause. General Sherman left Savannah February 1, marched

with almost no opposition through the Carolinas and was soon ready to coöperate with Grant in the final campaign of the war. During the winter, though the Union army had gained little in its conquest of Virginia, the siege which the Confederates had endured at Richmond and Petersburg had reduced their power of resistance, and Lee determined to evacuate both places, attempt to join Johnston's army, which had made a faint protest against Sherman's advance, and flee to the mountains, where the contest could be continued indefinitely. The attempts of the Confederates to cut their way out of Petersburg, however, resulted in serious losses, and when the evacuation finally took place it was under such difficult conditions that Lee soon found himself confronted with the necessity of surrendering. This took place at Appomattox Court House, April 9, 1865. The wild rejoicing which this news caused at the North was suddenly hushed on the following Friday, April 14, by the assassination of President Lincoln, who, because of his unfailing common sense and high purposes, had become the central figure of the whole struggle. On April 21 Johnston surrendered to Sherman after a week of negotiation, and by May 26 all the forces of the Confederacy had laid down their arms. On May 10 President Jefferson Davis was captured and was sent a prisoner to Fortress Monroe.

The war had lasted four years; it had commanded the services, all told, of more than four million men, three-fourths of whom were in the armies of the North. Nine of every ten men in the South, and four of every nine in the North, had served in the armies for an average of three years; 110,000 Union soldiers were killed in battle or died from wounds, while 250,000 others died from disease, exposure or other causes. The South lost 94,000 men in battle, and nearly 200,000 others died in the service. Thus, in both armies, an average of 700 men died each day from the beginning of the war to the end. The war cost the United States government in money fully three and a half billion dollars; it cost the Confederacy fully two billion dollars. In addition to these sums the United States government has paid out to Union soldiers more than three billion dollars in pensions. The total cost to both sections, excluding the terrible destruction of property and the loss caused by the check to production, doubtless amounted to at least nine billion dollars.

The greatest result of the whole contest was the abolition of slavery, which had been a con-

stant source of weakness and dissension for a century. It made possible a real unity of all sections by removing the most conspicuous differences in their modes of life and thought. From the constitutional standpoint it decided that the United States was to be an "indestructible union of indestructible states."

See articles upon the important battles, generals and statesmen, and also the general article upon UNITED STATES OF AMERICA, subhead *History*.

Claf'lin, HORACE BRIGHAM (1811-1885), an American merchant and capitalist, born at Milford, Mass. He established a dry goods store at Worcester, Mass., and in 1843 removed to New York, where in the course of twenty years he built up one of the largest business houses in America. He contributed largely to charities and other philanthropical enterprises.

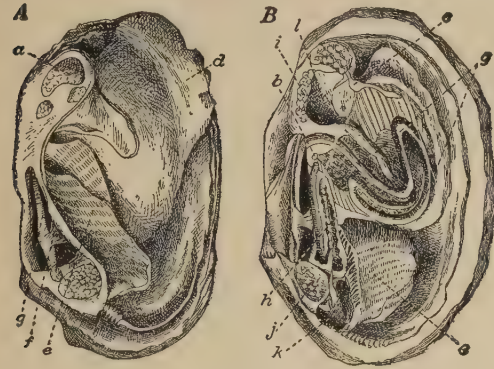
Claiborne, *klə'börn*, WILLIAM (1589-1676), an American colonist. He arrived in Jamestown in October, 1621, and soon acquired an estate amounting to 45,000 acres. In 1628 he was commissioned to make discoveries and to open trade with the Indians. He settled the Isle of Kent, in Chesapeake Bay, established a trading post and induced many settlers to locate on his lands. When Lord Baltimore's first colony arrived at Saint Mary's, in March, 1634, they claimed control over the island. The dispute was continued for many years, until Virginia, in 1776, released all claims to the territory beyond the Potomac River. Claiborne joined the Puritan party in its contest with the crown and was an important official in Virginia under the Commonwealth.

Claiborne, WILLIAM CHARLES COLE (1775-1817), an American politician, first governor of Louisiana. He was a member of the convention which prepared the Tennessee state constitution of 1796, and in 1797 he was elected to Congress, where he served two terms. In 1802 he was appointed governor of the Territory of Mississippi, and when Louisiana was bought from the French he was appointed one of the commissioners to take possession of the territory, of which he was made governor in 1804. Again, when Louisiana was made a state in 1812, he was elected governor, and in 1816 he was elected to the United States Senate, but was prevented by ill health from taking his seat.

Clam, the popular name of a number of species of mollusks, which resemble one another in having a double-hinged shell (See MOLLUSCA). In the United States the name is given to two

Clamp

species, the hard shell, or *quahog*, and the long, or soft, clam. The quahog has a nearly globular shell and lives on sandy bottoms, on which it stands erect on its thin edge. It is found from Cape Cod south, and in the New York markets it is generally known as the *clam*. The young are known as *little necks*.



THE CLAM

A—Right Valve of Shell, to show internal organs.

a. Anterior muscle for closing shell.

b. Opening of reproductive organ.

c. Brain.

d. Foot.

e. Gill.

f. Heart.

B—Dissection.

g. Intestine.

h. Kidney.

i. Liver.

j. Rear muscle for closing shell.

k. Space through which water passes in leaving shell.

l. Stomach.

Soft clams have a thin, smooth, somewhat oval shell and possess siphons that are often longer than the shell itself. These clams burrow in the sand above low water mark to such a depth that only the tips of their siphons protrude. When disturbed they emit a spurt of water from the siphon and withdraw from sight. They are obtained by digging them from the sands at low tide, and in many places they are found in large numbers. They are highly prized for food, and under favorable conditions are often cultivated. The term *clam* is also applied to fresh water mussels (see MUSSEL). The shell of the quahog was used as money by the Indians who formerly inhabited the New England states (See WAMPUM).

Clamp, a tool used by carpenters and carriage makers to hold parts of their work together, or to fasten the work to a bench. The bench clamp is usually made of iron and has but one screw. The carpenter's clamp is made of wood and has two screws; it is frequently called a hand screw. The hand screw is especially useful when it is desired to clamp pieces of wood together. One jaw is known as the *screw jaw* and the other as the *shoulder jaw*. In using it,

Claremont

care should be taken to keep the jaws parallel, so that an equal pressure may be maintained on all parts of the wood with which the jaws come in contact. When this is done a strong pressure is brought to bear upon the work by turning the screws until they are as tight as possible.

Clan, the name given to an indefinite social institution which has existed in almost every stage of civilization, both in eastern and western countries. It signifies a group of families claiming descent from common ancestors and united under one leader. The most common principle upon which the clan was organized was the obligation of all members to avenge one another's injuries. The most familiar form of clanship was furnished by the Highlanders of Scotland. Among them the name of the clan was frequently formed of that of the original ancestor with the prefix *mac*, meaning *son*; thus the MacDonalds were the sons of Donald, and every individual of that name was considered a descendant of the founder of the clan and a brother of every one of its members. The chief exercised his authority by right of inheritance as the father of his clan. The clansmen revered and served the chief with the blind devotion of children. Each clan occupied a certain portion of the country, and hostilities with neighboring clans were frequent. Few traces of the institution now remain in Scotland, except those which are perpetuated by sentiment; thus, all who possess the same clan name often speak of their "chief," though the latter has neither land nor special influence. A somewhat different form of the clan was developed among the American Indians. In this case the clan was made up of blood relations in the female line.

Clapp, MOSES EDWIN (1851-), an American lawyer and statesman, born at Delphi, Ind. educated in Wisconsin and at the University of Wisconsin law school and admitted to the bar in 1873. He began the practice of his profession in Saint Croix County, Wisconsin, and became its district attorney, but soon removed to Fergus Falls, Minn., and in 1891 to Saint Paul. He was for three terms attorney general of Minnesota. He was an unsuccessful candidate for the Republican nomination for governor in 1896. He succeeded the late senator Cushman K. Davis in the United States Senate in 1901 and was reelected in 1905 and 1911.

Claremont, *klair'mont*, N. H., a town in Sullivan co., 50 mi. n. w. of Concord, on the Sugar River and the Boston & Maine railroad.

Clarendon

It has good water power, contains granite and marble yards and manufactures cotton and woolen goods, shoes, machinery and various other articles. The town has the Fisk Free Library. Population in 1910, 7529

Clarendon, CONSTITUTIONS OF, a code of laws adopted in 1164 at a council of prelates and barons held at the village of Clarendon, Wiltshire, England. These laws, which were finally digested into sixteen articles, were brought forward by the king as "the ancient customs of the realm," and were enacted as such by the council, but they really involved a great scheme of administrative reform in the assertion of the supremacy of the State over clergy and laity alike. The power of the ecclesiastical courts was restricted, the crown secured the right of interference in elections to ecclesiastical offices, appeals to Rome were made dependent on the king's leave, ecclesiastical dignitaries were forbidden to leave the country without the royal permission, and, most important of all, the death penalty was made possible for the clergy by the provision that they might, in criminal cases, be brought before secular courts.

Clarendon, EDWARD HYDE, Earl of (1608-1674), chancellor of England. He began his political career in 1640 as a member of the Short Parliament, and he was later in the same year returned to the Long Parliament. At first he acted with the more moderate of the popular party, but he gradually separated himself from the democratic movement until, by the autumn of 1641, he was recognized as the real leader of the king's party in the House. Upon the breaking out of the Civil War he joined the king, was knighted, was made privy councilor and was appointed chancellor of the exchequer. In September, 1649, he joined Prince Charles at The Hague and was sent by him on an embassy to Madrid. After Cromwell's death Clarendon did more than any other man to promote the restoration of Charles, who as a reward made him lord chancellor. The marriage of the duke of York with his daughter, Anne Hyde, confirmed for a time his power, but by 1663 his influence with the king began to decline, and his station as prime minister made the nation regard him as answerable for the ill success of the war against Holland and for the sale of Dunkirk. In 1668 the king deprived him of his offices, an impeachment for high treason was commenced against him and he was compelled to seek refuge in Calais.

Clark

Clar'inet' or Clar'ionet', a wind instrument of the reed order, regulated by the fingers on holes and keys, the tone being produced by the vibration of a thin reed in the mouth-piece. Its lowest note is E below the F clef, from which it is capable, in the hands of good performers, of ascending more than three octaves. A clarinet can be played in only one key, therefore different clarinets are attuned to different keys, B flat, A flat and E flat being those most commonly used. The instrument was invented in 1690.

Clark, CHAMP [JAMES BEAUCHAMP] (1850-), an American lawyer and politician, born in Anderson co., Ky., educated in the common schools and at Kentucky University, Anthony



CHAMP CLARK

College and the Cincinnati Law School. He at different times was employed as farm laborer, clerk, editor, lawyer and president of Marshall College in West Virginia. He removed to Missouri and in 1889 was elected a member of the House of Representatives. From that date he has served continuously in that body, except for two terms, from 1891 to 1893, and from 1895 to 1897. In 1911 he was elected speaker of the House of Representatives, and in the following year was an unsuccessful candidate for the Democratic nomination for president. In 1913 he was reelected speaker of the House.

Clark, CHARLES HEBER (Max Adeler) (1841-), an American author. He engaged in journalism in 1865 and thereafter devoted him-

self almost exclusively to that work. Economic subjects occupied much of his attention, especially while editor of *The Manufacturer*, organ of the Manufacturers' Club of Philadelphia. However, his humorous writings, under the pseudonym of Max Adeler, are better known. In *Happy Hollow*, *Elbow Room*, *Random Shots* and *Desperate Adventures* are among his amusing books.

Clark, FRANCIS EDWARD (1851-), a Congregational clergyman, born in Aylmer, Canada, a graduate of Dartmouth College and Andover Theological Seminary, noted as the founder of the Young People's Society of Christian Endeavor. After 1887 Mr. Clark was continuously president of the United Society of Christian Endeavor. He was pastor of a Congregational church in Portland, Me., 1876-1883, and of a Boston church, 1883-1887.

Clark, GEORGE ROGERS (1752-1818), an American pioneer. He began life as a land surveyor and commanded a company of militia in Lord Dunmore's war with the indians. In 1776 he moved to Kentucky and soon became the leader of the frontiersmen. He was largely instrumental in securing the organization of Kentucky as a separate county. In 1777, Major Clark obtained permission and means from Virginia to attack the fort at Kaskaskia, which he captured in the following year. To revenge an invasion of Kentucky by Canadians and indians, he destroyed an indian town in Ohio in 1780. In the same year he went to Richmond to obtain approval from the authorities for his plans for the capture of Detroit, and while there took a command under Baron Steuben to defend Virginia against an invasion by a British force. In 1782 he gathered a large force and marched against indian towns on the Miami and Scioto, five of which were destroyed. About twelve years later he accepted a commission as major general in the French army, to conduct an expedition against the Spanish possessions on the Mississippi. General Clark's later years were spent in poverty.

Clark, WILLIAM (1770-1838), an American explorer, chiefly famous for his part in the celebrated Lewis and Clark expedition to the Pacific Ocean. He was born in Caroline co., Va., but was taken by his parents to Louisville, Ky., in 1784. He served in indian campaigns with Wayne, but resigned in 1796. In 1803 he again entered the army as second lieutenant, and in the following year he was placed in joint command, with Meriwether Lewis, of an expedition for the

exploration of the northwest (See LEWIS AND CLARK EXPEDITION). Upon his return he was made brigadier general of militia, was governor of Missouri territory from 1813 to 1821, and from the following year until his death was superintendent of indian affairs, with headquarters at Saint Louis.

Clark, WILLIAM ANDREWS (1839-), an American capitalist and politician, born near Connellsville, Pa. He was educated at Iowa College for the law, but did not enter the profession; he taught school for a time and removed to Colorado and then to Montana. There he became successively, machinist, banker, mine owner and manufacturer, and was largely interested in copper mines and railways. He was the unsuccessful Democratic candidate for delegate in Congress from Montana in 1888 and was nominated by the Democrats for the United States Senate in 1890, and, though claiming election, was denied a seat. He was elected senator in 1898, but a contest ensued and charges of corruption were made. He resigned immediately, but was again elected by the legislature for the term of 1901 to 1907.

Clarke, CHARLES COWDEN (1787-1877), an English writer. He was one of the minor members of the famous group which included Shelley, Keats and Leigh Hunt. His publications include *Adam the Gardener*, *Shakespeare Characters* and *Moliere Characters*. He is best known, however, by the edition of Shakespeare which he annotated in conjunction with his wife, and by *The Shakespeare Key*.

Clarke, JAMES FREEMAN (1810-1888), an American clergyman, born in Hanover, N. H. He graduated at Harvard and at the Cambridge divinity school, and founded in 1841, in Boston, the Church of the Disciples, of which he was pastor for forty-five years. It became one of the leading religious institutions of Boston. From 1867 till 1871 he was professor of natural religion and Christian doctrine in Harvard, and later was lecturer there on ethnic religions. He was an overseer of Harvard, a member of the state board of education, a trustee of the Boston public library and the author of several historical works and theological essays. He assisted in preparing the memoirs of Marchioness Ossoli (Margaret Fuller). His greatest work was *Ten Great Religions*.

Clarke's Fork, a river of the United States, rising in the Rocky Mountains, in western Montana. It flows in a northwesterly direction through the northern part of Idaho and enters

the Columbia in British Columbia. Its length is about 700 miles.

Clarks'burg, W. VA., the county-seat of Harrison co., 81 mi. e. of Parkersburg, on the Baltimore & Ohio Railroad. It is a distributing point for a large part of the business of Central West Virginia. It is in the midst of rich oil and gas fields and in the district of the state's earliest and most productive coal operations. Population in 1910, 9201.

Clarks'ville, TENN., the county-seat of Montgomery co., about 40 mi. n. w. of Nashville, on the Cumberland River and the Louisville & Nashville and the Tennessee Central railroads. Clarksville is one of the largest tobacco markets in the South and has tobacco and snuff factories, lumber, flour and iron mills and other works. The Southwestern Presbyterian University is located here. The place was settled in 1780 and was incorporated five years later. Population in 1910, 8548.

Clark University, an institution of higher learning at Worcester, Mass., founded in 1887 by James Gilman Clark. Its special object is to afford educators and specialists the best opportunities for research along the lines in which they are interested. In accordance with the terms of a bequest by Mr. Clark, a collegiate department was organized in 1902, to be conducted upon the same general plan as that of the post-graduate department. The University publishes the *American Journal of Psychology*, the *Paedagogical Seminary* and the *Mathematical Review*. Many important memoirs and monographs have also been published by its students and graduates. There are 24 instructors and about 100 students, and the library contains over 60,000 volumes.

Claud'ius, (10 B. C.—54 A. D.), a Roman emperor, whose full name was Tiberius Claudius Drusus Nero Germanicus. He was the son of Claudius Drusus Nero, stepson of Augustus. He lived in privacy, spending his time in writing and studying, until the murder of Caligula, when he was dragged from his hiding place and proclaimed emperor (41 A. D.). His reign was marked by the embellishment of Rome and by successes in Germany and Britain. Latterly he became debauched and left the government largely to his infamous wife, Messalina, who with his freedmen committed the greatest enormities. He was poisoned by his fourth wife, Agrippina, the mother of Nero.

Claxton, PHILANDER PRIESTLEY (1862—), an American educator, born in Bedford co.,

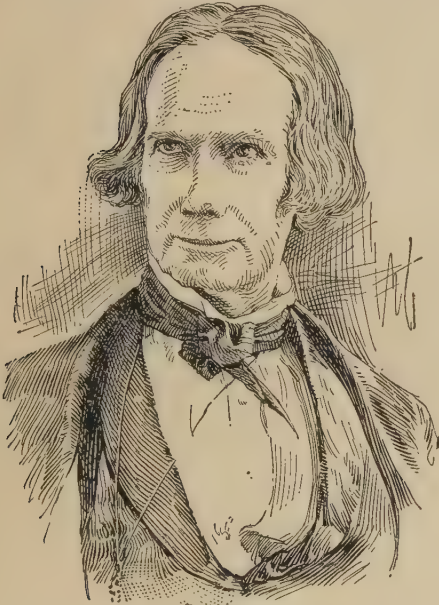
Tenn. He received his degree from the University of Tennessee and did post-graduate work at Johns Hopkins University and in Germany. After serving successively as superintendent of schools at Kinston, Wilson and Asheville, N. C., he became in 1893 professor of pedagogy in the North Carolina State Normal and Industrial College. From 1902 to 1911 he was professor of education in the University of Tennessee, and during the last five years of that time had charge of the department of secondary education and inspection of high schools. In July, 1911, he became United States commissioner of education.

Clay, the name of various earths, which consist of silicate of aluminum, with small proportions of the silicates of iron, calcium, magnesium, potassium and sodium. All the varieties are characterized by being weighty, compact and hard when dry, but plastic when moist; smooth to touch; not readily diffusible in water, but when mixed, not readily settling in it. Their tenacity and ductility when moist and their hardness when dry have made clays from the earliest times the materials of bricks, tiles and pottery. One of the chief varieties is *porcelain clay*. *Kaolin*, or china clay, a white clay with occasional gray and yellow tones, is the purest (See KAOLIN). *Potter's clay* and *pipe clay*, which are similar but less pure, are generally of a yellowish or grayish color, from the presence of iron. Fire clay is a very refractory variety, always found lying immediately below the coal; it is used for making fire bricks and crucibles and for lining furnaces used in smelting iron and some other metals. *Loam* consists of clay mixed with sand, oxide of iron and various other foreign ingredients. Other varieties are *fullers' earth*, *Tripoli* and *boulder clay*, the last a hard clay of a dark brown color, with rounded masses of rock of all sizes embedded in it, the result of glacial action. The distinctive property of clays as ingredients of the soil is their power of absorbing ammonia and other gases and vapor generated on fertile and manured lands; indeed, no soil will long remain fertile unless it has a fair proportion of clay in its composition.

Clay, CASSIUS MARCELLUS (1810-1903), an American statesman, born in Kentucky. He graduated at Yale in 1832, and in 1845 he established an abolitionist paper, entitled *The True American*. His presses were seized by pro-slavery mobs, and he was threatened with assassination, but he removed his office to Cincinnati, continuing the circulation of his paper in Ken-

tucky. He was a member of the Kentucky legislature in 1835, 1837 and 1840. During the Mexican War he served with distinction, and in March, 1861, he was appointed minister to Russia, but he returned in the following year to become major general of volunteers. He resigned in March, 1863, and was again sent to Saint Petersburg. Upon his return in 1869 he resumed the practice of law.

Clay, HENRY (1777-1852), an American statesman, born in Ashland, Hanover co., Va. He received practically no education, but after acting as clerk in two or three state offices,



HENRY CLAY

meantime being closely associated with Chancellor George Wythe of Virginia, he began the study of law and opened his first office at Lexington, Ky., in 1797. He soon became famous as a jury advocate and public speaker, and at the age of twenty-six was a member of the Kentucky legislature. In 1806 to 1807 and 1810 to 1811 he filled unexpired terms in the United States Senate and was already conspicuous as a forceful debater and as an earnest advocate of a protective tariff. In 1811 he was chosen to the House of Representatives, where he was at once made speaker. Here he became prominent as an advocate of war and from his official position practically forced the War of 1812 upon the country. He acted as one of the American commissioners in the peace negotiations in 1814.

Clay was continuously reelected speaker of

the House until his retirement in 1821 and again occupied that post when reelected to Congress in 1823. During his career in the House his most important act was doubtless the introduction of the famous Missouri Compromise of 1820 (See MISSOURI COMPROMISE). In 1824 he was an unsuccessful candidate for the presidency against Crawford, Jackson and John Quincy Adams. No candidate had a majority of the electoral vote, and the contest was therefore sent to the House of Representatives, where Clay, being fourth in the list, was ineligible for election. He transferred his strength to Adams, and upon the latter's election Clay was appointed secretary of state. This fact gave the basis for the charge of corruption between Adams and Clay, which, though utterly ungrounded, was used to the latter's political injury throughout his career. As chief of Adams's cabinet he displayed considerable ability, but he lost his prestige in Congress through absence and never regained it.

Clay was again elected to the Senate in 1831, became a bitter opponent of President Jackson and was his competitor in the election of 1832, but was overwhelmingly defeated. He again became conspicuous as pacificator in the nullification controversy of 1833, when, by his compromise tariff measure, he probably prevented a resort to arms. Throughout the rest of his career, Clay was one of the foremost orators in America, and though unsuccessful in his great ambition to become president of the United States he was an acknowledged leader of the Whig party. He retired from the Senate in 1842, was defeated for president by Polk in 1844 and was defeated for the nomination by Taylor in 1848, but in the same year he was reelected to the Senate. From this time forward he devoted his efforts to allaying the sectional strife upon the slavery question, and he made his last great speech in the Senate in support of the Compromise of 1850. Though a man of strong convictions, Clay often sacrificed popular favor by seeking to win the support of all sections and factions, and thus gained the reputation of being vacillating and even insincere.

Clayton, JOHN MIDDLETON (1796-1856), an American jurist, born in Sussex co., Del., and educated at Yale. He studied law, gained a large practice, became United States senator and was appointed secretary of state in 1850 in President Taylor's cabinet. His principal achievement was the negotiation of the Clayton-Bulwer Treaty.

Clayton

Clayton POWELL (1833-1914), an American soldier and politician, born at Bethel, Pa. He was educated at the Bristol Academy in Pennsylvania and later studied civil engineering. In 1859 he was chosen engineer and surveyor of Leavenworth, Kan., and began his life in the West. At the beginning of the war he enlisted as captain of the First Kansas Infantry, and a year later he was appointed lieutenant colonel of the Fifth Kansas Cavalry. The greater part of his military service was carried on in Arkansas, where he led several minor expeditions and where he settled as a planter at the close of the war. In 1868 he was elected governor of Arkansas, and from 1871 to 1877 he was United States senator. From 1897 to 1905 he was United States minister to Mexico.

Clayton-Bulwer Treaty, a treaty between Great Britain and the United States, concluded in 1850, by which both parties agreed to guarantee the neutrality of a canal through Central America, but not to exercise any control over the territory nor to erect any fortifications there. The United States made several attempts to have this treaty modified or abrogated, but the British government refused to concur, until 1901, when the Clayton-Bulwer treaty was abrogated (See HAY-PAUNCEFOTE TREATY). The negotiators were Secretary of State John M. Clayton, for the United States, and Sir Henry Bulwer, special ambassador, for Great Britain.

Clearfield, PA., the county-seat of Clearfield co., 172 mi. n. e. of Pittsburg, on the west branch of the Susquehanna River, and on the Pennsylvania and other railroads. The borough is in a fertile agricultural region, near deposits of coal, limestone and fire clay, and contains lumber and flour mills, brick yards, foundries, tanneries and other factories. It was settled in 1805 and was incorporated in 1840. Population in 1910, 6851.

Clearing House, a place or institution where the claims of several parties against one another are adjusted. The term has come to have a special significance as an important part of modern banking methods. In this special sense, the method of operations of the clearing house is about as follows: Each bank sends to a central office two representatives, a so-called delivery clerk and a settling clerk. In a large room each bank is assigned a desk. Upon arrival at the clearing house, usually about 11 A. M., the clerks from each bank deposit at the manager's table a ticket showing the aggregate amount due to them from other banks, as

Cleavage

shown by checks which these clerks have brought with them. The manager enters this sum to the credit of the bank presenting the ticket. The checks which each set of clerks have brought with them are divided into bundles, each of which contains checks upon some other one bank. At a given signal the settling clerks seat themselves at their respective desks and the delivery clerks pass among them, delivering to each settling clerk bundles of checks drawn on the bank which he represents. When each settling clerk has received all the bundles of checks drawn against his bank he draws up a statement of the demands made upon him. The lists of all the settling clerks are then sent to the manager, who draws up a statement showing the amount which each bank owes to each of the other banks in the association. The checks against the banks are then returned to the banks by their respective clerks; the separate items are approved, and at a certain hour the debtor banks must pay to the creditor banks the amounts due. This operation is repeated every business day of the year.

The clearing house system first arose in Lyons, France, as early as 1667, but the methods in use at present originated in London not earlier than the beginning of the nineteenth century. By far the most important clearing-house association in the world is that of New York City, organized in 1853. During its first year it transacted a business of \$5,750,455,985. In 1912 its business amounted to \$96,672,300,863, or an average daily business of more than \$300,000,000. The immense saving of time and labor which this method accomplishes may be seen from the fact that of this immense amount about $4\frac{1}{2}$ per cent of the daily balances were paid in actual money. Next in importance in the United States to the New York clearing house is that of Chicago, but its business equals scarcely one-seventh that of the New York clearing house. Then follow Boston, Philadelphia, Saint Louis, Pittsburg, Kansas City, San Francisco, Baltimore, in the order named. The clearings of the whole country amounted to more than \$168,500,000,000 in 1912. See BANKS AND BANKING.

Clearing Nut, a small tree of the same genus as the nux vomica, common in Indian forests. Rubbing the seeds on the inside of a vessel containing turbid water speedily precipitates the impurities.

Cleavage, *kle'vaj*, the manner or direction in which crystallized substances regularly cleave

Cleburne

or split. The regular structure of most crystallized bodies becomes manifest as soon as they are broken. Each fragment presents the form of a small polyhedron, and the very dust appears under the microscope an assemblage of minute solids, formed according to some plan of crystallization. The directions in which such bodies thus break up are called their planes of cleavage. In certain rocks, again, there is a tendency to split along planes which may coincide with the original plane of stratification, but which more frequently cross it at an angle. This tendency is the consequence of the readjustment by pressure and heat under which the character of the rock is changed. See CRYSTALLOGRAPHY; METAMORPHISM; STRATIFIED ROCKS.

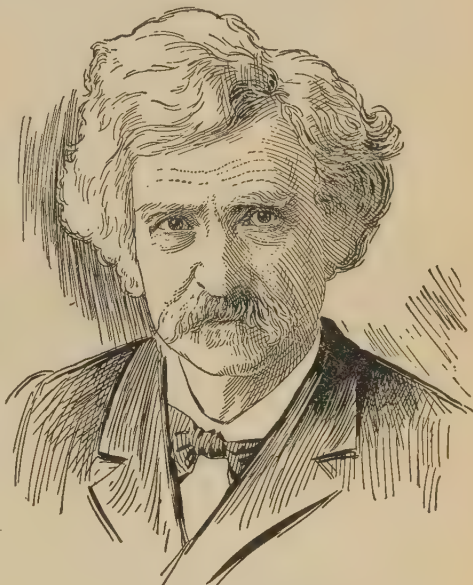
Cleburne, TEXAS, the county-seat of Johnson co., 55 mi. s. w. of Dallas, on the Gulf, Colorado & Santa Fé, the Missouri, Kansas & Texas and other railroads. The city has a large trade with the surrounding agricultural region. It contains cotton compresses, oil mills, flour mills, foundries, machine shops and division offices and shops of the Santa Fé railroad. Population in 1910, 10,364.

Clem'atis, a genus of woody, climbing plants. The most common species, virgin's bower or traveler's joy, is conspicuous in the hedges both of England and the south of Scotland, first by its copious clusters of white blossoms and afterward by its feather-tailed, silky tufts attached to the fruits. There are about one hundred species of clematis, most of which are found in temperate climates. In North America about twenty species grow well. The most common of these is the virgin's bower, which resembles the European clematis both in its color and in its feathery pistils. A rarer species, found in Maine, Wisconsin and a few other states, has large, single, purplish drooping flowers.

Clemens, *klem'enz*, SAMUEL LANGHORNE (1835-1910), an American humorist, generally known as "Mark Twain." Mr. Clemens was born at Florida, a little hamlet in northeastern Missouri, about 50 miles west of the Mississippi, Nov. 30, 1835. His early education consisted of the limited training he could then get in this small country town and at thirteen years of age he entered a printing office. After becoming an expert compositor he worked for short periods of time in Saint Louis, Philadelphia, New York and other places. In 1851 he gave up his work in printing offices and went on a Mississippi steamboat as apprentice, where in 1857 he became a pilot. Here he met with a great

Clemens

variety of experiences which later he used to much advantage in writing the series of highly entertaining chapters which now make his book *Life on the Mississippi*. Here, too, he must have originated his pen name, for "By the mark, twain" was the cry used by the man who sounded the depth of the water to tell the pilot that it was two fathoms deep. It is said that Captain Isaac Sellers had signed articles *Mark Twain* in the New Orleans *Picayune* previous to the time Clemens assumed the name, but it now belongs completely to the latter and thousands upon thousands of readers know the genial humorist by no other. When the Civil War broke out



SAMUEL L. CLEMENS

navigation on the Mississippi ceased and Mr. Clemens lost his occupation as pilot. For some little time he was a member of a company of Confederate sympathizers organized near his home, but he never was engaged in active war service. About this time his brother had been appointed Territorial Secretary of Nevada and Mr. Clemens went out with him to Nevada City, where for a time he was interested in mining. In 1862, however, he became a reporter for a Virginia City paper, and several years later he removed to California, where he was a reporter for the *Morning Call*. In 1866 he went to the Sandwich Islands, and upon his return began his career as lecturer, attracting considerable attention. The publication in 1867 of the *Jumping Frog of Calaveras County*

increased his reputation, and *Innocents Abroad*, an account of an excursion through Egypt and the Holy Land, won him international fame. In 1870 he married, and after editing for two years the *Buffalo Express*, settled in Hartford, Conn. He joined a publishing firm of New York in 1884, but after a few years of success the firm became bankrupt, and Clemens, to meet his heavy losses, traveled as a lecturer, meeting with the greatest success. For some years after 1890 he lived in Europe, and many of his books were written during that period.

Besides the works mentioned above, Clemens is noted chiefly for his *A Connecticut Yankee at King Arthur's Court*, *Pudd'nhead Wilson*, *The Prince and the Pauper*, the *Adventures of Tom Sawyer* and the *Adventures of Huckleberry Finn*. The last two, especially, are of their kind unrivaled, not only because they are full of Clemens's genial humor, but because they give truthful, vivid pictures of the free life of a boy along the Mississippi River.

Cleopatra, (69-30 B. C.), a Greek queen of Egypt, the last of the Ptolemies. When she was seventeen years old her father died, leaving her as joint heir to the throne with his eldest son, Ptolemy; when she was deprived of her part in the government she won Caesar to her cause and was reinstated by his influence. In a second disturbance Ptolemy lost his life, and Caesar proclaimed Cleopatra queen of Egypt, though she was compelled to take her brother, the younger Ptolemy, as colleague. Caesar continued some time at Cleopatra's court. By poisoning her brother, she became sole possessor of the regal power, took the part of the triumvirs in the civil war at Rome and after the Battle of Philippi went to do homage to Antony at Tarsus. Their meeting was celebrated by splendid festivities; she accompanied him to Tyre and was followed by him on her return to Egypt. After his conquest of Armenia he again returned to her. On the commencement of the war between Augustus and Antony, the latter lost a whole year in festivals and amusements with Cleopatra at Ephesus, Samos and Athens, and when at last the fleets met at Actium, Cleopatra suddenly took to flight, with all her ships, and Antony immediately followed her. Augustus advanced on Alexandria and proved himself proof against Cleopatra's remarkable fascinations. Believing Cleopatra to be dead, Antony threw himself on his sword, and shortly afterward Cleopatra killed herself, by applying an asp to her arm, to escape the igno-

miny of being led in a Roman triumph.

Cleopatra's Needles, the name given to two Egyptian obelisks, formerly at Alexandria; one of them is now in New York, the other in London. They are made of rose-red granite and were originally erected by Thothmes III in Heliopolis, being dedicated to the god Ra, or the Sun. They were taken to Alexandria shortly before the commencement of the Christian era and remained there until 1877, when they were presented to Great Britain and the United States by the Khedive Ismail Pasha. The New York obelisk is 69 feet high and weighs 200 tons. The sides are covered with inscriptions of Thothmes III and Rameses II.



CLEOPATRA'S NEEDLE
In Central Park New York

Clepsydra or **Water Clock**, an ancient instrument for the measurement of time by the escape of water from a vessel through an orifice. In the older ones the hours were estimated simply by the sinking of the surface of the water, in others the water surface is connected with a dial plate and hand by a system of weights and floats. See **CLOCK**.

Cleveland, *kleev'land*, OHIO, the county-seat of Cuyahoga co., and second largest port of the Great Lakes, situated on Lake Erie at the mouth of the Cuyahoga River, 183 m. s. w. of Buffalo, 263 mi. n. e. of Cincinnati and 357 mi. s. e. of Chicago, on the Lake Shore & Michigan Southern, the Pennsylvania, the Erie, the Cleveland, Cincinnati, Chicago & Saint Louis, the Baltimore & Ohio and other railroads. The city is built upon slightly rising ground and extends along the lake front for a distance of 10 miles; its greatest extent inland is about 5 miles,

and its area is 33 square miles. The Cuyahoga River divides the city into two unequal parts, the eastern and the western, the latter of which is known as West Cleveland. This stream flows through a deep and somewhat broad valley, whose surface is considerably below the remaining portions of the city, and this valley is occupied by freight depots, factories and lumber yards. The stream and valley are crossed by two noted bridges, one of which cost over \$2,250,000. The streets are broad and well paved, and many of them are shaded with maples and elms, which add to the beauty of the city and have given it the name *Forest City*. From Monumental Park the streets extend in all directions, but the longest thoroughfares in the lower part of the city are parallel to the lake shore, while farther inland they are nearly east and west. Crossing these are streets extending from the lake to the southern portion of the city. In nearly all sections the streets cross at right angles. Euclid Avenue is noted for its beauty and begins at Monumental Park and extends eastward for several miles. This street is lined with beautiful residences surrounded by well-kept lawns, and is considered one of the finest boulevards in America.

The city contains a number of parks, the most important of these being Rockefeller Park of 800 acres, situated in the eastern part of the city; Lake Front Park, running along the lake shore; Wade Park, and Forest City Park. Wade Park is noted for its gardens and for the statue of Commodore Perry, which was formerly located in Monumental Park. Besides Euclid Avenue, boulevards worthy of mention are Ambler Parkway, Gordon Boulevard, the Ridge Road and the Grand Public Boulevard. Among the cemeteries the Erie Street, Monroe Street, Jewish and Lakeview are worthy of mention. The last occupies an eminence east of the city, and on its highest point it contains the Garfield memorial, a magnificent tomb erected to the memory of the martyred president. This structure is of Ohio sandstone and contains in relief sculptures representing incidents in Garfield's life. The interior is in the form of a chapel decorated with symbolical friezes and containing a marble statue of Garfield in the center. The remains are in a crypt underneath the chapel. The whole monument cost about \$130,000.

Among the public buildings worthy of note are the new government building and the post-office. These with the customhouse and city hall, enclose a square near the center of the city

and form its most noted architectural feature. The Arcade, the Sheriff Street Market, the Union Station, the Caxton, Garfield, New England, Hickox, Lennox and the Music Hall, seating 5000, are buildings worthy of note. The most noted churches are the Catholic cathedral; Saint Paul's and Trinity Protestant Episcopal; the First Presbyterian, familiarly known as *Old Stone*; Calvary and Woodland Avenue Presbyterian; the First Congregational; the First Methodist, and the Euclid Avenue Baptist.

The city has a public library of over 200,000 volumes and the Case Library, open to members only, of 50,000 volumes; also the library of the Western Reserve Historical Society, and others belonging to various organizations and institutions. There is an excellent system of public schools, and the higher institutions of learning include the Western Reserve University, the Case School of Applied Science, the Saint Ignatius College (Roman Catholic), besides numerous parochial and private institutions.

The location of Cleveland renders it an important port for the transshipment of coal and iron ore; consequently, the city has built up one of the largest iron industries in the country. Among the manufactures the most important are those connected with the output of iron and steel and their manufactured products. Cleveland is also one of the largest centers of the petroleum industry and has large refineries. The city is the most important shipbuilding point on the Great Lakes, and each year a large number of steamboats and other craft are launched from her yards. It is also an important railroad center, besides being one of the principal lake ports, and its traffic is enormous. The harbor is protected by a government breakwater nearly two miles in extent, and it is so constructed as to enclose on two sides a basin over 300 acres in extent. The river has been dredged and contains piers along both its banks, so that there are now five miles of wharfage accessible to all lake steamers. Industries of lesser importance, though large, include meat packing, the manufacture of clothing and the manufacture of numerous small articles, such as scientific and optical instruments, paints and chemicals.

Cleveland is within the territory of the old Connecticut claim known as the Western Reserve (See WESTERN RESERVE). It was named from Moses Cleveland, who was sent from Connecticut to survey the land and who established a settlement in 1796. In 1810 Cuyahoga County was organized and Cleveland became the county-seat.

Five years later it was incorporated as a village, and in 1818 the *Cleveland Gazette and Commercial Register* appeared. This was the first newspaper published in the town. The growth of Cleveland was slow until after the cutting of a tunnel across the bar at the mouth of the river, which made its harbor accessible to lake boats. In 1836 it was incorporated as a city, and from that time to the present its growth has been steady. Population in 1910, 560,663.

Cleveland (STEPHEN) GROVER (1837-1908), an American statesman, twice president of the United States, born in Caldwell, Essex co. N. J. The death of his father, a Presbyterian



GROVER CLEVELAND

clergyman, compelled young Cleveland to earn his own living, and he became a clerk and assistant teacher in the New York institution for the blind. In 1855 he started west, but stopped at Buffalo, where he was admitted to the bar in 1859. In 1863 he became assistant district attorney of Erie county and he was made sheriff in 1870. In 1881 he was elected mayor of Buffalo on the Democratic ticket, though the city was strongly Republican, and his vigorous and efficient administration led to his nomination and election as governor of the state by a remarkable plurality. His career as governor was marked by exceptional ability, fearlessness and honesty. He was nominated for president at the national Democratic convention held in Chicago in 1884, and was elected over Blaine, Republican, by a small plurality.

As president he made extraordinary use of the veto power to curb unworthy legislation,

especially private pension bills, and boldly advocated a reduction in the tariff. In 1888 he was again Democratic candidate for president, but he was defeated by the Republican candidate, Benjamin Harrison. He then removed to New York and practiced law. On June 2, 1886, he had married, at the White House, Miss Frances Folsom, daughter of his former law partner. He was again nominated by his party for president in 1892, in spite of opposition from his own state, and was elected. His second term was memorable because of a fearful financial panic, which he strove to avert by the repeal of the Sherman silver purchase law and by the issue of government bonds for the replenishment of the treasury's gold reserve; for the passage of the Wilson tariff law, which, though reducing some duties, was deemed so ineffectual by the president that he would not sign it, and for the notable message from the president to Congress, in accordance with which steps were taken to compel England to arbitrate her controversy with Venezuela.

After his retirement from the presidency, Mr. Cleveland did not enter public life, but he was a frequent contributor to magazines upon topics of timely importance, and delivered each year a series of lectures in Princeton University. He was elected a trustee of the University soon after his retirement from the presidency, and took an active interest in its affairs. The tower of the new graduate school is called the Cleveland Memorial Tower in his honor.

Cle'venger, SHOBAI VAIL (1812-1843), an American sculptor. His father was a weaver, who went to Cincinnati with his son and apprenticed him to a stonecutter. The son at once manifested artistic ability in carving tombstones and he soon learned to hew busts in freestone. Subsequently he chose the career of a sculptor and settled in New York City. Many of his works are contained in the art galleries of New York, Boston and Philadelphia. In 1840 he went to Rome, where he produced his *North American Indian*, which attracted considerable attention. But for his early death he would probably have gained a high reputation as a sculptor.

Click Beetle, **Springing Beetle** and **Skip-jack**, names given to a family of beetles because of their peculiar behavior. If the click beetle is touched or alarmed, he folds up his legs and feigns death. If placed upon his back, he will lie quietly for a moment, and then by a sudden jerking motion, accompanied by a clicking

Clients

sound, he will throw himself some little distance in the air, and, landing on his feet, will run away. There are about 500 species of click beetles in the United States alone. The largest and most conspicuous is the eyed elater, which is grayish-black in color and has two large black spots, like eyes, on the sides of its thorax. These beetles usually live singly in flowers, grass and decaying wood. The destructive larvae are known as wireworms. Some of the tropical click beetles are luminous, and one species carries two glowing spots on each side of its thorax. These beetles are sometimes worn as ornaments.

Clients, in ancient Rome, citizens of the lower ranks who chose a patron from the higher classes, whose duty it was to advise and assist them, particularly in legal cases, and in general to protect them. The clients, on the other hand, were obliged to provide a dowry for the daughters of the patron if he had not sufficient fortune; to follow him to the wars and to vote for him if he was candidate for an office. This relation continued till the time of the emperors.

The name is now applied to one who consults an attorney, or who engages him to prosecute or defend an action at law or to represent him in a business transaction.

Cliff, a steep slope of the earth's surface. The name is also applied to a headland or a precipice. Cliffs frequently form the sides of narrow valleys and the walls of canyons (See CANYON). They are formed by erosion, by volcanic action and by upheaval. In the first case they are formed when running water cuts deep canyons through plateaus, such as those along the Colorado and Yellowstone rivers, in the western part of the United States. They are formed by volcanic action when a viscid lava pours down the slope of a mountain in thick sheets. The first flow becomes solid, and the lava which follows piles up behind it and overflows, sometimes forming cliffs several hundred feet in height, with very rough surfaces. Violent upheavals of the earth's crust sometimes fracture the strata, elevating a portion and forming a nearly perpendicular cliff. Overhanging cliffs along river banks are formed when the lower strata of the rocks, being softer than those above, are gradually worn away by the water, the rock above being left suspended over the water. See EROSION.

Cliff Dwellers, an aboriginal American race who preceded the Pueblo Indians and who built houses in the cliffs and rocks. Their cave dwellings were often artificial caves, closed and

Cliff Dwellers

strengthened by stone walls, while their cliff houses were veritable fortresses, to which the inhabitants retreated when menaced by any serious danger. Any situation pleased them, provided it gave hope of a little security. These dwellings have even been found hollowed in layers of volcanic ashes, hardened by time, while all around, pieces of cut silex and fragments of pottery attest the long sojourn of the people. One "cliff palace" has a length of 421 feet, contains 127 rooms and is capable of affording shelter to 1500 persons. The dwellings are constructed either of assorted stones, held together with moistened clay, or of adobe or sun-dried bricks. The circular ruins contain a number of small cells, and a building, often half-subterranean in the center, which the Spaniards called an *estufa*. Some contend that these *estufas* were the council chambers where the principal men of the tribe assembled; while others hold that they were meant to keep the sacred fire, which is even to-day an object of veneration with the Indians. The cliff houses take the shape of the platform on which they stand, and the walls are soldered to the sides of the rock. Even to-day the marks of the tools and the workmen's fingers can be seen on the masonry. Sometimes the homes of the Cliff Dwellers were at a great altitude, being as high as 800 feet above the level of a river. Later researches have revealed the existence of springs which had been tapped and brought into natural or skillfully made reservoirs.

The entire San Juan valley is strewn with the ruins. There is one long, narrow structure running in front of a cave 200 feet wide at the mouth, where windows eighteen inches square are the only means of entrance. Several human hands painted in ocher are to be seen on the walls. Recent explorations have brought to light a small number of mummies in a fair state of preservation. Side by side with the bodies, weapons, utensils and ornaments were found. The access to the dwellings is often very difficult. A narrow, dangerous path leads down from the top of the cliff, but is barred by a house built of quarried and well-cemented stone, of better and probably later construction than the other dwellings. Agriculture seems to have been more perfect among the inhabitants of Arizona than among those of New Mexico. The former cultivated maize, beans, watermelons, cotton and tobacco, and irrigation ditches show their skill and industry. Among their domestic animals were the turkey, and probably the rabbit and a species

of llama. Neither here nor anywhere else in these regions have the excavations resulted in the discovery of any metal objects, with the exception of a few small amulets made of copper. On the other hand, a great variety of pottery has been found, always tastefully decorated. Numerous weapons of polished stone, bone implements and sea shells have also been discovered.

The excavations carried out in one place in Arizona produced some 300 skeletons, about fifty of which are complete. The bodies had been laid, fully-dressed and bent double, in a chamber measuring twenty-two feet in diameter.

Clifford, NATHAN (1803-1881), an American lawyer and jurist, born in Rumney, N. H. He began the practice of law in York county, Maine, in 1827. He was elected to the state legislature, became speaker of the house and attorney general of the state in 1834. Five years later he was elected to Congress, where he served two terms, and in 1846 he became attorney general of the United States. He negotiated the treaty with Mexico by which California and the adjoining territory was annexed to the Union. In 1858 Clifford was appointed associate justice of the United States Supreme Court, and in 1877 he was president of the electoral commission which decided the Hayes-Tilden controversy.

Climate, the average condition of the atmosphere, with respect to temperature, humidity, rainfall, wind and storms. Weather is the atmospheric condition for a short period of time, as a day or a week, but climate is the condition of weather or the sort of weather for a long period of years. Weather is constantly changing; but there have been no marked changes of climate for centuries.

The chief determining factors of climate are latitude, altitude, the inclination of the earth's axis to the plane of its orbit, distance from the sea and prevailing winds. Of all these, latitude is the most important factor, since upon it, more than upon any other cause, depends the temperature of a region, which is the most important climatic feature. The temperature is the highest in the equatorial regions and gradually diminishes toward the poles. Were the surface of the earth perfectly smooth, there would be little or no variation in temperature for places having the same latitude; but the general effect produced by the different angles at which the sun's rays strike the earth between the equator and the poles is modified by numerous local conditions. Chief among these is altitude, and this, next to latitude, is the most important agency that affects

climate. The average temperature of a place falls one degree for every 300 feet in ascent above sea level. In other words, 300 feet in altitude will produce the same variation in temperature as from 30 to 60 miles in latitude, according to the location of the place. Hence in the mountainous regions of the tropics are all grades of climate from that of the torrid zone to that of the arctic regions. Illustrations of this occur in the equatorial regions of South America and among the Himalayas in Asia.

Water is a great equalizer of temperature. It warms and cools much more slowly than the land. Hence, regions located in the vicinity of large bodies of water, such as those on the sea coast or near the Great Lakes, have a more equable temperature than those situated far inland. Winds blowing over the oceans acquire the same temperature as the water. Hence in the temperate regions countries situated on the western coasts of the continents usually have a warmer climate than those on the eastern coasts in the same latitude, since the general direction of the winds is westerly. This is seen very clearly in comparing the temperature of places having the same latitude on the eastern and western coasts of North America. In each instance the higher temperature on the western coast is due to the prevailing westerly winds which have been warmed by blowing a long distance over warm marine currents. A similar contrast exists between the eastern coast of North America and the western coast of Europe.

Mountain ranges influence rainfall and winds; hence, they are important factors in determining the climate of certain localities, as that of the Great Central Plain in North America. This region is situated between the Appalachian Mountains on the east and the Rocky Mountains on the west. The prevailing winds are from the north or the south; hence, all of the interior of North America is subject to sudden changes of temperature, since the north wind causes a fall and the south wind a rise in temperature. In Europe the comparatively low western coast allows the warm winds from the Atlantic to blow over a large area; hence, that portion of the continent, though far north, has a comparatively warm climate. The Alps form a barrier which prevents these winds from blowing over the countries to the south, so that these countries are wholly under the influence of the warm winds blowing across the Mediterranean; hence, Spain and Italy have a warmer climate than portions of the United States in the same latitude.

Climbing Perch

Climate is the chief factor in determining the animal and vegetable life and the character of civilization of any locality. While the largest land animals and the most luxuriant vegetation are found in the tropics, it is within the temperate regions that the most intelligent and useful of the lower animals and the most valuable plants have developed. It is also within the north temperate region that the great nations of civilization have originated and reached their highest stage of enlightenment. See METEOROLOGY; WEATHER BUREAU.

Climbing Perch, an oriental fish, remarkable for having little sacs at the side of its head, which can retain sufficient water to keep the gills moist and to enable the fish to live out of water for six days. The climbing perch of India proceeds long distances overland in search of water, when the pools in which it has been living have dried up.

Clin'ton, IOWA, the county-seat of Clinton co., is located on the Mississippi River, 138 mi. w. of Chicago, on the main line of the Chicago & Northwestern and on the Chicago, Milwaukee & Saint Paul, the Chicago, Burlington & Quincy and the Chicago, Rock Island & Pacific railroads. The Northwestern machine shops are located here. The manufactures include lumber, sash, doors and blinds, brick, locks, machinery, wagons, harness, furniture and other articles. Wartburg College, Mount Saint Clare Academy and Our Lady of Angels Seminary are located here. Lyons was annexed to the city of Clinton in 1895. Population in 1910, 25,577.

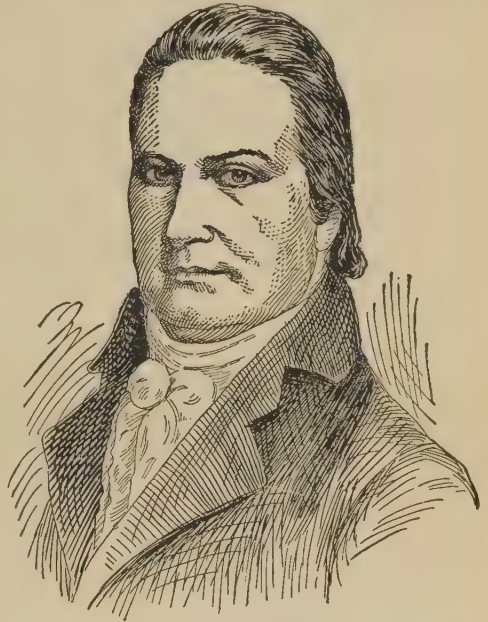
Clinton, MASS., a town in Worcester co., 12 mi. n. of Worcester, on the Nashua River and on the Boston & Maine, the New York, New Haven and Hartford railroads and a number of electric lines. There is good water power, and the place contains manufactures of dress goods, machinery, wire work, carpets and other articles. It was incorporated as a separate town in 1850. Population in 1910, 13,075.

Clinton, Mo., the county-seat of Henry co., 90 mi. s.e. of Kansas City, on the Missouri, Kansas & Texas, the Saint Louis & San Francisco and other railroads. Baird College is located here. The place was settled in 1835 and was incorporated as a village five years later. Population in 1910, 4992.

Clinton, DE WITT (1769-1828), an American statesman and lawyer, born at Little Britain, Conn., and educated at Columbia College. He was admitted to the bar in 1788, and in 1797 he was elected to the assembly, in 1798 was a mem-

Clinton

ber of the senate of the State of New York and in 1801 was elected United States senator. For twelve years, with two short intervals, he was mayor of New York. He was again member of the senate of New York from 1803 to 1811, and he was lieutenant governor of the state for two years. In 1812 he was defeated by Madison for president. In 1817 he was chosen governor



DE WITT CLINTON

of the state and was reelected three times. During his third term, in 1825, he officiated at the opening of the Erie Canal, thus witnessing the completion of a work to whose promotion he had devoted the best years of his life, and with which his name will be inseparably connected. See ERIE CANAL.

Clinton, GEORGE (1739-1812), an American soldier and statesman. He served in the last French and Indian war and was elected to the New York assembly. In 1775 he was a delegate to the Continental Congress and was appointed a brigadier general in the Continental Army in 1777. He was the first governor of the State of New York, serving from 1777 till 1795 with exceptional ability. Clinton was of great service to the colonial cause, through his influence over the indians. He opposed the Federal Constitution on account of its centralization of power. In 1791 he advocated the improvement of internal communication by navigation companies. He was again chosen governor in 1801, and

three years later he was elected vice-president, which office he held until his death.

Clinton, SIR HENRY (about 1738-1795), a British general. He arrived in Boston as major general in 1775, served at Bunker Hill, was second in command in the movements that compelled the Americans to evacuate New York in September, 1775, and was left in command of that city in the summer of 1777. He stormed Forts Clinton and Montgomery, and was appointed commander in chief of His Majesty's forces in America, with the rank of lieutenant general. In June, 1778, he evacuated Philadelphia, and on his retreat through New Jersey he fought with Washington at Monmouth Courthouse. He went to South Carolina in December, 1779, and captured Charleston in the spring of the following year. In October, 1781, he set sail for Chesapeake Bay with a large force to aid Lord Cornwallis, but at the entrance of the Chesapeake he learned that Cornwallis had surrendered, and thereupon he returned to New York. In June, 1782, he returned to England. He was elected to Parliament and was afterward placed in command of Gibraltar, where he died.

Clinton, JAMES (1736-1812), an American soldier, the brother of George Clinton and the father of De Witt Clinton. During the French and Indian War he distinguished himself at Fort Frontenac, and he served in General Montgomery's expedition to Canada at the opening of the Revolution. He was made brigadier general in the Continental army in 1776, commanded Fort Clinton when it was attacked by Sir Henry Clinton in 1777 and was the last man to leave the works. Although suffering from a severe bayonet wound, he escaped by sliding down a precipice of one hundred feet to the creek. He took part in General Sullivan's expedition against the Iroquois of western New York in 1779. After the close of the war he served in the New York convention which decided on the ratification of the United States Constitution.

Clio, in Greek mythology, the muse of history, daughter of Zeus and Mnemosyne. Her attributes are a wreath of laurel upon her head, a trumpet in her right hand and a roll of papyrus in her left.

Clive, ROBERT, Baron of Plassey (1725-1774), an English general and statesman. He went to India as a clerk in the service of the East India Company, and when in 1747 war broke out in India between the French and English he joined the army. By his capture of Arcot and his defense of it against a greatly superior force of

French and natives in 1751, he won a very favorable reputation, and this was heightened by his future successes over the French. In 1753 he sailed to England to recover his health, and he was received most cordially. Two years later he was back in India, and he was in the same year placed in command of the expedition sent to Bengal. He took Calcutta and defeated the nawab of Bengal in a battle at Plassey, thus establishing English supremacy in India. He placed on the throne of Bengal a general of the defeated nawab, and through him he became possessed of great wealth. On his second return to England in 1760 he was accorded many honors, but he was sent back to India to straighten out the affairs of the East India Company. This he accomplished in about eighteen months. Returning to England, he was met with the accusation of having abused his power to gain wealth, and an investigation was made. His complete acquittal followed, but the disgrace of the accusation so preyed upon his mind that he committed suicide.

Cloaca Maxima, the great sewer at Rome, built some 2500 years ago. A portion of it is still in use, and it may be seen under the Roman Forum and where it empties into the Tiber. It is about thirteen feet square.

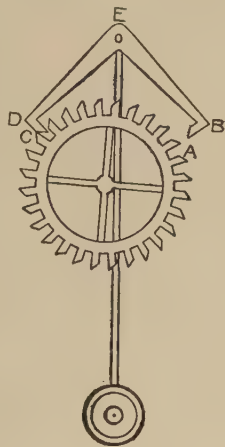
Clock, an instrument for measuring time and indicating hours, minutes and, usually, seconds, by means of hands moving over a dial plate. The necessary parts of a clock are the weight or spring, which furnishes the motive power; the escapement, which is connected with the pendulum or balance wheel; the train of wheels; the dial, and the hands. The weight is attached to a cord, which is wound around a drum, to one end of which a large wheel is fastened. As the weight descends, the unwinding of the cord imparts motion to the train of wheels. The motion is regulated by a pendulum, which is connected with the escapement wheel, as shown in the figure. At the top of the pendulum rod is a pallet, *E*. When the pendulum swings to the right, the tooth *A* of the escapement wheel escapes from the pallet *B*, while the tooth *C* is brought against the pallet *D*. The ends of these pallets are so shaped that as the teeth of the escapement wheel are released by them, sufficient force is imparted to the pendulum to keep it swinging. The pinion of the escapement connects with cogs, usually called *leaves*, on a larger wheel, whose pinion connects with another large wheel, and so on until the necessary number of wheels is used to produce a rotation, once in twelve

hours, of the wheel which carries the hour hand. Another wheel, carrying the minute hand, makes a complete rotation once an hour. The movement of the wheelwork is regulated by the vibrations of the pendulum. The clock can be made to run faster or slower by shortening or lengthening the pendulum, and the pendulum of any common clock has a hand and screw below the bob for this purpose (See PENDULUM). The hands are attached to pivots, which pass through the dial, the pivot of the minute hand passing through that of the hour hand, so that each hand moves past the other without hindrance.

The striking part of a clock is entirely separate from the time-keeping part and is operated by a different weight or spring. It is, however, set in motion by a lever which is connected with the time-keeping part.

Sun dials and water clocks were the earliest instruments used for measuring time (See SUN DIAL; CLEPSYDRA). It is not known when the first attempts at clock-making were made, but there are accounts of such attempts as early as the seventh century. In the early part of the ninth century a clock was presented to Charlemagne, and in the following century one was given to Pope Sylvester II; but it is not known that these were clocks with wheels and a weight, like those of a later date. It is probable that the invention of the clock is due to the monks, who needed a timepiece which would enable them to discharge their various duties at stated periods. Clocks are known to have been in use early in the fourteenth century, and some of them were quite elaborate. They not only marked the hours of the day, but they also indicated the course of the sun and moon and the ebb and flow of the tides. In the fourteenth century the first large clocks on steeples also appeared, and from that time to the present the manufacture of clocks has been an important industry.

The first clocks used in the United States had no case, but they were fastened to the wall of the room near the ceiling, and the weights and pendulum were without protection. Later a case was added, which rested upon the floor and



extended upward for six feet or more. For many years the works of all American clocks were of wood and were made entirely by hand. Finally, brass clocks replaced the wooden ones, and these at first were also made by hand, but later a die for casting the wheels from rolled brass plates was used. With the introduction of this invention, clock-making by machinery was inaugurated and machine-made timepieces took the place upon the market of those made by hand. The largest clock manufactory in the United States is at Waterbury, Conn. See WATCH.

Clois'ter, an arched way or gallery, often forming part of certain portions of monastic and collegiate buildings, usually having a wall of the building on one side, and an open arcade, or a series of windows with piers and columns adjoining an interior yard or court, on the other side. The central open space, or garth, contained the well and garden, and here the monks met and talked, for the cloisters were especially intended for recreation. Many beautiful cloisters still remain in the churches of Rome, Germany, France and England. In a strict sense, the term denotes the entire space inclosed within the walls of a monastery or other religious institution, comprising the church, dormitories, chapter house and all other buildings.

Cloquet, *klo kwet'*, Minn., is situated 30 mi. w. of Duluth, on the Northern Pacific and the Great Northern railroads. It is in the midst of an extensive lumber region and has a number of large sawmills, shingle mills and pulp mills. Population in 1900, 3072; in 1910, 7031.

Clot'bur. See COCKLEBUR.

Cloth, a woven fabric, usually made of cotton, wool, flax or silk. But in tropical countries it may be made of the fiber of hemp, jute or other plants. Cloth is woven on the loom (See LOOM). The weaver uses two sets of threads, the *warp* threads, which are run lengthwise of the goods, and the *weft* or *woof* threads, which run across the warp. The *selvage* is the edge of the cloth, woven in such a manner as to prevent raveling. The warp takes various names; it is sometimes called the *foundation* or *back* of the goods, and the woof is often called the *filling*. When one says that a piece of goods has a cotton back and a silk filling, he means that the warp is of cotton and the weft of silk (See WEAVING). All-wool cloths have both the warp and weft of wool, but most so-called woolens contain more or less cotton or other fiber. Worsted goods are made of combed wool that is well twisted

Clothes Moth

(See WORSTED). The varieties of cotton cloth most extensively used are muslins, including sheetings and shirtings, as well as the finer goods of this name; also the cotton cambric, canvas, duck, dimity, gingham and calico. Satinette, tweeds, jeans and some cashmeres are made on a cotton warp with a weft of wool. Lawns, cambrics, Damascus sheetings and towelings are made of flax and are called linens. Cloth may be plain, like common muslin; twilled, like tweeds; piled, like velvet and plush; figured, like damask; mixed, like cheviot, and checked or striped, like gingham, according to the way in which the weft threads are woven into the cloth. The width of the cloth depends upon the number of threads in the warp; its fineness or coarseness depends on the size of the threads and their distance apart. See SPINNING; WEAVING.

Clothes, kloze, Moth, the name given to several moths whose larvae are destructive to woolen fabrics, feathers and furs. They not only feed upon the material, but the larvae use it in the construction of the cases in which they undergo the pupa stage. It is not easy to prevent the damage done by clothes moths, but airing and sweeping closets frequently, and beating, brushing and exposing clothes to the sunlight will diminish the ravages. Tobacco, camphor, naphthalene and cedar shavings seem obnoxious to the insects.

Clo'tho. See FATES.

Cloud, a collection of visible vapor, or watery particles, suspended in the atmosphere at a considerable altitude. Clouds differ from fogs only in their height and degree of density. The average height of clouds is calculated to be two



FIG. 1

and one-half miles, thin and light clouds being much higher than the highest mountains; while thick, heavy clouds often touch low mountains, steeples and even trees. Clouds differ much in form and character, but they are generally

Cloud

classified into four simple or primary forms: (1) The *cirrus* (Fig. 1), so-called from its resemblance to a lock of hair, consisting of fibers which diverge in all directions. Clouds of this description float at a general height of from three to five miles above the earth's surface. (2) The



FIG. 2

cumulus (Fig. 2), a cloud which assumes the form of dense convex or conical heaps, resting on a flattish base. It is called also the summer cloud. Under ordinary circumstances these clouds accompany fine weather, especially in the heat of summer. They attain their greatest



FIG. 3

size early in the afternoon and gradually decrease toward sunset. (3) The *stratus* (Fig. 3), so named from its spreading out uniformly in a horizontal layer, which receives all its additions in volume from below. It belongs essentially to the night, and it is frequently seen on calm summer evenings after sunset ascending from the lower to the higher grounds, and dispersing in the form of a cumulus cloud at sunrise. (4) The *nimbus*, or rain cloud, is recognized by its fibrous border and uniformly gray aspect. It is a dense cloud, spreading out into a crown of cirrus and passing beneath into a shower. It presents one of the least attractive appearances among clouds, but it is only when the dark surface of this cloud forms its background that the splendid phenomenon of the rainbow is exhibited in perfection (See FOG; RAIN; WIND).

The first three primary forms of clouds are subdivided as follows: 1, the *cirro cumulus*, composed of a collection of cirri, and spreading itself

Cloudberry

frequently over the sky in the form of beds of delicate snowflakes; 2, the *cirro stratus*, or *wane cloud*, so called from its being generally seen slowly sinking and in a state of transformation—when seen in the distance a collection of these clouds suggests the resemblance of a shoal of fish, and the sky, when thickly mottled with them, is called in popular language a *mackerel sky*; 3, the *cumulo stratus*, or *twain cloud*, one of the grandest and most beautiful of clouds, consisting of a collection of large, fleecy clouds overhanging a flat stratum or base.

Cloud'ber'ry, a fruit found plentifully in the north of Asia, America and Europe, and common in some of the more elevated moors of Great Britain. The plant is from four to ten inches high, with a rather large, handsome leaf. The flowers are large and white, and the berries, which have a very fine flavor, are orange yellow in color and about the size of a brambleberry.

Cloud'-burst, the name generally applied to an unusually heavy local rain. In the United States the term is restricted to a rain exceeding six inches and falling at the rate of ten inches, or more, per hour. Cloud-bursts cover only very small areas, usually but a few acres in extent. They generally occur in mountainous regions and seem to be caused by thunder storms. In the United States they are quite frequent along the eastern slope of the Rocky Mountains, but the term cloud-burst is often incorrectly applied to local heavy rains occurring among the Appalachians. A cloud-burst causes the sudden overflow of streams and often converts dry channels into mountain torrents whose effect is very destructive. That they are the result of the sudden condensation of large quantities of water vapor is evident to all, but the causes which produce this condensation are not yet well understood.

Clove'-bark is furnished by a tree of Brazil and the West Indies. It is in pieces more or less long, almost flat, thick, fibrous, covered with a white epidermis of a reddish-yellow color inside, of a nutmeg and clove odor, and of an aromatic and sharp taste, similar to both cloves and cinnamon. The culilawan, which grows in the Molucca Islands, is often confounded with the clove-bark, as is also the cinnamon.

Cio'ver, a name given to a large genus of the pea family. There are more than one hundred fifty species, of which some are weeds, but many are valued as food for cattle. Common red clover lives for two years and sometimes, especially on chalky soils, for three years. This is the kind

Cloves

most commonly cultivated, as it yields better than any of the other sorts. White clover is a most valuable plant for pasturage over the whole of Europe, Central Asia and North America, and it has also been introduced into South America. The bee gathers much of its best honey from the flowers of this species. Alsike, hybrid, or Swedish clover has been long cultivated in the south of Sweden, and for some time also in other countries; it is strongly recommended for cold, moist, stiff soils. It resembles the common red clover in duration, stature and mode of growth. Perennial red or meadow clover much resembles the common red, but differs somewhat in habit, and the bright red flowers are larger and form a less compact head. Its produce is less in quantity and is not so nutritive as that of the common red. Clover is an excellent crop for exhausted lands, for the tubercles on the plant roots gather and store quantities of nitrogen, which go to restore the fertility of the soil.

Cloves, *klohvz*, the dried flower buds of a tree which is a native of the Molucca Islands. It



CLOVE

Opened and unopened flower bud and a longitudinal section of bud.

belongs to the myrtle tribe, now cultivated in Sumatra, Jamaica, the West Indies and Brazil. The tree is a handsome evergreen, from fifteen to thirty feet high, with large, elliptic, smooth leaves and numerous purplish flowers on jointed

stalks. Every part of the plant abounds in the oil for which the flower buds are prized. The spice yields a very fragrant odor, and it has a bitterish, sharp and warm taste. It is sometimes employed as a hot and stimulating medicine, but it is more frequently used in cooking.

Clovis (465-511), king of the Franks, succeeded to the throne in 481. In 486 he overthrew the Roman governor at Soissons and occupied the country between the Somme and the Loire. He married a Christian princess, and he himself became a Christian as a result of the favorable outcome of a battle, for the success of which he had prayed to the God of his wife. In a struggle with the Visigoths he was entirely successful.

Club, a select number of persons in the habit of meeting for the promotion of some common object, as social intercourse, literature or politics. The coffee houses of the seventeenth and eighteenth centuries are the best representatives of what is meant by a modern club, while the clubs of that time were commonly nothing but a kind of restaurant or tavern where people resorted to take their meals. The first celebrated London club was the one which met at the Mermaid Tavern, and of which Shakespeare, Beaumont, Fletcher and Raleigh were members. The Kit-Kat Club, founded early in the seventeenth century, took its name from Christopher Katt, the man who supplied its mutton pies. Addison, Congreve and Sir Robert Walpole were among its members. Another club, formed about the same time, was the Beefsteak Club, which numbered among its members Fox, Sheridan and Hogarth. Its motto was "Beef and Liberty." Originally these two clubs had no pronounced political views, but in the end they began to occupy themselves with politics. Perhaps the most celebrated club of the eighteenth century was that which was first called "The Club," and which numbered among its members Doctor Johnson, Sir Joshua Reynolds, Edmund Burke, David Garrick, Oliver Goldsmith, Edward Gibbon and others. This club exists to the present day.

The growth of the club in its modern sense began after the close of the wars with Napoleon, when the army and navy officers, living on half pay, combined their resources. Among the most important London political clubs of the present day are the Carlton Club, a sort of headquarters for the Conservative party, and the Reform Club, the great club of the Liberal party. Clubs for social purposes, for literary,

musical, artistic or dramatic purposes, are very numerous, and the whole number of prominent London clubs is estimated at over one hundred. Clubs and club-life have reached a very high plane in the United States. Every important city numbers in its more important buildings the palatial quarters of some prominent club. New York, Chicago, Boston, Philadelphia and San Francisco vie with one another in the sumptuous surroundings of their clubs. The Union League, Manhattan and Metropolitan clubs of New York, the Union League and Chicago clubs of Chicago, may be mentioned among the more important ones. Clubs for women have become common of late years, especially in the United States, and many men's clubs admit women as visitors.

Club Moss, a common name for two different genera of plants that are grouped with the ferns and scouring rushes. In many respects the club mosses resemble the true mosses, having slender running stems, which branch and bear a great number of minute leaves. These club mosses, or *ground pines*, as they are sometimes called, are pretty little plants of no especial value except for decorative purposes, but they grow luxuriantly in mild or moist climates in all parts of the globe. In the earlier history of the world, during the carboniferous period, some species attained enormous size, rivaling trees in their height and in the thickness of their stems. Remains of these are found in great quantities in coal deposits.

Cluny or **Clugny**, *kloo ne'*, a town of eastern France, 11 mi. n. w. of Macon. Here was a Benedictine abbey, founded in 910, at one time the most celebrated in France, having 2000 monastic communities directly under its sway in France, Italy, Spain and England, the inmates of which formed the congregation of Cluniac monks. The Abbey church was destroyed in 1789. In the museum of the town is kept a model of the magnificent structure.

Clyde, **LORD**. See CAMPBELL, SIR COLIN.

Clytemnestra, in Greek mythology, the half-sister of Helen and of Castor and Pollux, and the wife of Agamemnon. During the absence of her husband in the war against Troy, she bestowed her favors on Aegisthus, and together they murdered Agamemnon on his return from Troy. Then with Aegisthus she governed Mycenae for years, until she, with her lover, was killed by her son Orestes.

Coach, *koche*, a closed, four-wheeled carriage, drawn by horses and designed for the conveyance of passengers. The earliest carriages

appear to have been all open. At Rome both covered and uncovered carriages were in use. After the fall of the Roman Empire they went out of use again, and during the feudal ages the custom was to ride on horseback, the use of carriages being considered effeminate. They do not appear to have become common till the fifteenth century, and even then they were regarded exclusively as vehicles for women and invalids. Later on they became, especially in Germany, part of the appendages of royalty. Coaches seem to have been introduced into England about the middle of the sixteenth century, but they were for a long time confined to the aristocracy and the wealthy classes. Hackney coaches were first used in London in 1625. They were then only twenty in number and were kept at the hotels, where they had to be applied for when wanted. In 1634 coaches waiting to be hired at a particular stand were introduced. Stagecoaches were introduced into England about the same time as hackney coaches. The first stagecoach in London appears to have run early in the seventeenth century, and before the end of the century they were started on three of the principal roads in England. Their speed was at first very moderate, about 3 or 4 miles an hour. They could run only in the summer, and even then their progress was often greatly hindered by floods and by the wretched state of the roads. Mail coaches next followed.

The first coaches in America belonged to wealthy families and were used in the colonial period. They were forerunners of the stagecoach. Previous to the Revolution four-horse stage wagons were in use for conveying passengers and goods between the largest cities. Later the stagecoach took the place of these wagons and continued in use until the construction of railways. The stagecoach has been the pioneer of transportation from the Atlantic to the Pacific, and each decade has seen it abolished in different localities as railways have rendered it unnecessary. The most common pattern in the United States is the Concord coach, which has the body supported on strong leather straps, instead of on springs. While these straps prevent jolting, they give the coach a peculiar lurching motion which is extremely tiresome when driving over rough roads. The tallyho is a coach used for pleasure in large cities and about fashionable resorts. It has seats, not only within, but also on top, and can carry a large number of passengers.

Coal, kole, in the ordinary meaning of the

term, a mineral fuel in solid form; in its broadest application, any substance formed by the burning of organic matter with a limited supply of air. When we speak of coal in the commercial sense, we mean mineral coal.

FORMATION. Coal is found in seams, or veins, which are separated from one another by layers of slate-like rock. From the fossils and the impressions of plants which these rocks contain, we know the sort of vegetation from which the coal was formed and are also able to determine the method of its formation. Coal was formed in a manner similar to that in which peat is formed at the present day. During the coal period (See CARBONIFEROUS SYSTEM) large areas of low land were choked with vegetation, which died at the bottom, but kept growing at the top. As the plants died they partially decayed, and the weight of the vegetation above pressed them closely together. In the course of time these areas were depressed and covered with water and sand. After remaining under water for a long time, they were again elevated and the sand became rock, upon the surface of which soil accumulated, and in this flourished another growth of vegetation similar to that previously destroyed. In time this was sunk below the water and was covered. The pressure and heat attending these changes converted the vegetable matter into coal. There were as many upheavals and depressions as there are seams of coal, and since these have not all been discovered, we do not yet know how many such changes occurred. The veins of coal and the rock lying between them, taken together, are known as the *coal measures*. The vegetation of the time resembled ferns, rushes and club mosses, and it also included certain species of trees that are now extinct. It was very luxuriant, the ferns forming trees twenty-five or more feet in height, and some of the club mosses exceeding in size the largest climbing plants of the tropical regions.

VARIETIES. Coal is divided into three varieties, according to its degree of hardness and the amount of carbon which it contains. These are anthracite, bituminous and lignite. The early geologists applied the name bituminous to a certain kind of coal, because it had some of the properties of real bitumen—it melts at a temperature far below the burning point. Later investigations proved that no kind of coal contains bituminous matter, but the name is still applied to the coal with 50 to 80 per cent of fixed carbon. Anthracite coal has from 80 to 90 per cent of carbon.

Coal

Anthracite. Anthracite is the hardest and best variety of coal. It is supposed to be that which was first formed, and it occurs deep in the earth. The largest mines are found in the eastern part of Pennsylvania and in Nova Scotia. Though some of the veins of anthracite occur at great depths, many of them, on account of the disturbance of the coal measures, have been thrown up and outcrop on the hillsides in the anthracite region. Veins of this sort are easily mined, since the coal is obtained by excavating a gallery or tunnel into the side of the hill. Anthracite is generally used for heating dwellings, and it is now to quite an extent employed in the manufacture of illuminating gas. It burns with little or no flame and without smoke, but it produces an intense heat.

Bituminous Coal. Bituminous coal is often known as *soft coal*. It contains much more bituminous matter than anthracite and is much



COAL FIELDS OF UNITED STATES AND CANADA

softer; many varieties of it burn with considerable flame and produce a dense black smoke caused by the unconsumed carbon escaping into the air. This coal is found upon the western slope of the Appalachian Mountains, and the fields extend westward as far as the Mississippi River. The great coal fields of Ohio, West Virginia, Indiana and Illinois contain bituminous coal measures. Bituminous coal is much more extensively distributed than anthracite and is mined in much larger quantities. It is used on locomotives, in the manufacture of coke and for many other industrial purposes.

Cannel Coal is a variety of bituminous coal which is very compact and which, when lighted, burns from one end of the lump like a candle; hence its name. It is desirable for burning in open grates.

Lignite. This is the most recently formed coal, is usually of a brown color and contains

more or less earthy matter. It is found in the coal measures west of the Mississippi River, and important mines have been opened in North Dakota, Montana and a number of states in the Rocky Mountains. Because of the scarcity of other fuel in these localities, lignite is of considerable local value, though its impurities render it useless for manufacturing purposes, and it does not burn as readily or produce as intense heat as either of the other varieties described.

DISTRIBUTION. Coal is quite generally distributed over the earth. In Europe the leading coal producing countries are Great Britain, Germany, France, Austria, Belgium and Russia. The Russian fields are the most extensive on the Continent, but they have not been fully developed. In Asia coal is found in India, China, Japan and the Malay Archipelago. It is supposed that the coal fields of China are the most extensive in the world, but as yet they have

not been developed. As far as discovered, the coal fields of Africa are in the southern part of the continent, in Cape Colony and the vicinity of the Zambesi River. There are also valuable coal fields in Australia, New Zealand and the Philippine Islands, and profitable mines have been opened in Mexico, Argentina and Chile.

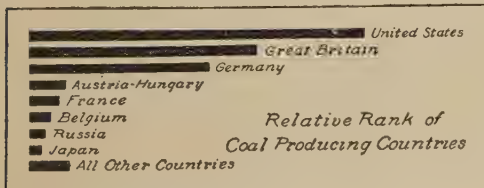
As far as it is known the coal measures of the United States far exceed in area those of any other country. Altogether, they include over 300,000 square miles, or an area of more than six times the size of the State of Ohio. These coal fields are distributed as follows: (1) Those of the Appalachian region, extending along the Appalachian Mountains from the northern boundary of Pennsylvania to Alabama, having a length from northeast to southwest of over 900 miles and a width of from 30 to 180 miles; (2) coal measures of the Mississippi valley, extending from the western slope of the Appalachians to

Coal

the river, these measures including the coal fields of Ohio, Indiana, Illinois and western Kentucky; (3) the western field, which includes the coal areas west of the Mississippi River, south of the forty-third parallel of latitude and east of the Rocky Mountains, and (4) the Rocky Mountain field, including the areas in the Rocky Mountains and on the Pacific slope. Important coal districts of this field occur in Washington, Oregon and California. There is also another small area in Michigan, from which bituminous coal is obtained.

The coal measures of Canada are geologically extensions of those in the United States. The most important fields are in Nova Scotia and British Columbia. These fields yield a high grade of bituminous coal. The coal produced in Saskatchewan and Alberta varies from a low grade of lignite to a good bituminous.

PRODUCTION. Great Britain produces nearly as much coal as the United States, though her coal beds are of much smaller area, including



only about 12,000 square miles. The annual output of coal for the world is about 1,200,000,000 short tons. Of this, the United States produces about 450,000,000 tons, Great Britain about 300,000,000 and Germany 250,000,000. These three countries supply approximately 85 per cent of the world's demands for coal. Canada's production is still small, from 12,000,000 to 14,000,000 tons a year, of which Nova Scotia produces one-half, British Columbia one-fourth and Alberta a little less than one-fourth.

The following table summarizes the average annual production of the United States:

States	Tons	Value
Pennsylvania.....	215,000,000	\$270,000,000
West Virginia.....	60,000,000	65,000,000
Illinois.....	55,000,000	70,000,000
Ohio.....	30,000,000	35,000,000
Indiana.....	15,000,000	15,000,000
Alabama.....	13,500,000	18,000,000
Colorado.....	10,000,000	15,000,000
Other States.....	51,500,000	212,000,000
Totals.....	450,000,000	\$700,000,000

HISTORY. It is not known when or by whom coal was first used. It is referred to by Greek historians as early as 300 B. C., and it was in use

Coastal Plain

in Great Britain as early as 852 A. D. It is supposed that the Britons were the first people to make practical use of it, and coal-mining was in successful operation in the island more than three hundred years before Columbus discovered America. The first discovery of coal in the United States, of which we have any record, was made by Father Hennepin near Ottawa, Ill., in 1679. The first mine worked in the United States was opened at Richmond, Va., in 1750. Anthracite was mined as early as 1793, but on account of the difficulty of igniting it, it had not come into general use until the second quarter of the nineteenth century. Bituminous coal came into use in the United States earlier than this, but on account of difficulty of transportation it was not placed on the market until after 1820. From that date the use of coal became general, and with the increase of railway lines its uses have multiplied. Coal is now so closely connected with all lines of industries that the business of the country is practically dependent upon it.

Coal Tar or Gas Tar, a substance obtained in the distillation of coal, for the manufacture of illuminating gas. It is a dark-colored, more or less viscid, mass, with a strong, disagreeable odor. It passes over with the gas into the condensers, along with ammonia liquor, but being heavier than the latter, it is easily separated from it when the whole is allowed to stand. Coal tar was formerly of comparatively little use; but in recent years a great number of valuable products have been derived from it by distillation, such as ammonia, naphtha, creosote, carbolic acid and benzene, while it is also the source of the whole series of aniline colors, other dyes, of alizarine and salicylic acid. See ANILINE.

Coastal, kose'tal, Plain, in general, a plain formed along the coast by the action of waves and tides, but, particularly, that portion of North America lying along the coast of the Atlantic Ocean and the Gulf of Mexico and extending from about the latitude of New York to the city of Vera Cruz. The western boundary of this plain is the foothills of the Appalachian Mountains, and the upper portion of it is usually called the Piedmont region. The plain varies in width on the Atlantic coast from 50 to 200 miles, and from the Gulf of Mexico it extends northward into the Mississippi Valley as far as the Ohio River. A narrower section also extends south and west through Texas and along the coast of Mexico. Along the Atlantic coast the western boundary is marked by an abrupt rise, caused by

the upheaval of the rocks which formed the mountains. This edge, or rise, is usually known as the Fall Line. Below this most of the streams are navigable, and at the fall line they furnish abundant water power. For these reasons numerous thriving cities are located along this line. Among these are Richmond, Va., Raleigh, N. C., and Columbia, S. C.

Coast and Geodetic Survey, UNITED STATES, a bureau in the department of commerce and labor, having charge of the surveys of the United States and its dependencies, including the interior, coasts and coast waters. This bureau was established in 1807 and was made a bureau in the treasury department, but its work was so delayed that but little was accomplished previous to 1832. From that year to the present time the scope of its work has been rapidly broadened. In 1878 the bureau was designated as the Coast and Geodetic Survey, and in 1903 it was transferred to the department of commerce and labor. As now organized the bureau is in charge of a superintendent and operates under two divisions, the field division and the office division.

Some of the most important results accomplished by the bureau are the making of a minute survey of the coasts and the mapping of the same, together with the coast waters as far out as necessary, of the entire coast line of the United States, including Alaska, and of a part of the island possessions; the making of a network of levels over the eastern half of the United States, from the Atlantic Ocean to the Great Lakes; the making of important triangulations across the United States, notably that along the thirty-ninth parallel, and another along the ninety-eighth meridian, which extends into Mexico. These triangulations form the basis for many other surveys. The bureau also publishes an annual report, besides numerous charts and tide tables for all the principal, and many of the minor, ports of the world.

Coast Defense. See FORTIFICATION.

Coast Guard, an organization consisting of about 4000 veterans of the British navy, whose duty it is to patrol the coast of England constantly. The coast guards resemble somewhat the life-saving corps of the United States, but the duties in England include the prevention of smuggling and the manning of ships maintained for coast defense.

Coasting, a favorite winter pastime from the earliest days, and still in the United States the most popular winter sport with children, ex-

cepting, perhaps, skating. The sleds used in coasting are made in a great variety of forms, some low and some high, some long and narrow. In some the runners are of solid board, shod with steel, while in others the runners consist of open iron framework, drawn forward and curved upward in front. Where the snow is loose the high sleds are better, but on a well-packed slide the low ones make better time and are easier to handle. *Bobs* are constructed by fastening two ordinary sleds together by a long plank, the first one being attached to the plank by a pivot, which allows motion in steering. The steersman usually lies flat and grasps the forward sled in such a way that he may turn it easily, while the rest of the party group themselves behind him. See TOBOGGANING.

Coast Range, a range, or series of ranges, at a short distance from the Pacific coast, extending through the western part of California, across Oregon into Washington, where it is continued by the Olympic Mountains, and thence into British Columbia. Some of the summits rise to a height of 7000 and 8000 feet, and among the best known in California are Mounts Hamilton, Tamalpais and Diablo. The San Bernardino Mountains are sometimes considered a part of the Coast Range.

Coatesville, *kohts'vil*, PA., a borough in Chester co., on the Philadelphia & Reading and the Pennsylvania railroads. The industrial establishments include boiler factories, iron and steel works, foundries, and silk, woolen and paper mills. The place was settled about 1800 and was incorporated in 1867. Population in 1910, 11,084.

Coati, *ko ah'te*, or **Coati-mondi**, the name of certain South American flesh-eating mammals,



COATI

belonging to the raccoon family. The coati has a longer body than other members of the same family, and has a long, flexible snout. Coatis feed on worms, insects and the smaller quadrupeds, but chiefly on eggs and young birds. There are two species, the *Mexican* and the *Brazilian*.

Cobalt

Cobalt, *ko'balt*, a greenish-white metal, very brittle and of a fine, close grain, compact but easily reducible to powder. It crystallizes in parallel bundles of needles. Cobalt is not found in a pure state, except in meteorites, and it is seen in nature most frequently with arsenic or sulphur, though it has other compounds. Its usefulness is confined largely to the arts, as it furnishes a permanent blue color to glass and enamels upon metals, porcelains and earthenware. *Arsenical cobalt* is white or steel-grayish in color, is of a granular texture and when heated gives off the odor of garlic. *Sulphide of cobalt* is compact and massive in its structure; *oxide of cobalt* is brown or brownish-black, generally friable and earthy. Cobalt is mined in large quantities near Cobalt, Ontario, about 330 miles north of Toronto.

Cobb, HENRY IVES (1859-), an American architect, born in Brookline, Mass., and educated at the Massachusetts Institute of Technology and at Harvard University. He went to Chicago in 1881, where he soon attained success. Among the buildings in Chicago which he designed are the Newberry Library, the Church of the Atonement, and the Federal building. He was special architect for the United States government from 1893 to 1903, and designed the state capitol at Harrisburg, Pa.

Cobb, HOWELL (1815-1868), an American statesman, born in Cherry Hill, Ga., and educated at Franklin College. In 1843 he was elected to Congress and he was chosen speaker in 1849, after a bitter contest. In 1851 he was elected governor of Georgia, serving until 1853, and two years later he again entered Congress. Later Cobb was made secretary of the treasury, serving from 1857 to 1860. When the Civil War began, he was appointed brigadier general, and subsequently major general, in the Confederate army, but took no part in military movements. He was a bitter opponent of the Congressional reconstruction policy.

Cob'den, RICHARD (1804-1865), an English statesman, known as the "apostle of free trade." After receiving a meager education, he was taken as an apprentice into a warehouse in London. In 1830 he started a cotton manufactory in Manchester. His first political writing was a pamphlet entitled *England, Ireland, and America*, published in 1835. In this he gave clear utterance to the political views to which he adhered throughout his life, advocating non-intervention in the disputes of other nations, and maintaining it to be the only proper object of the foreign

Coburg

policy of England to increase and strengthen her connections with foreign countries in the way of trade and peaceful intercourse. In 1841 he entered Parliament, and he directed his efforts toward the repeal of the Corn Laws. The credit for the repeal, which was accomplished in 1846, belonged largely to Cobden. During the Civil War in America he was strongly in favor of the North.

Coblentz or **Koblentz**, *ko'blents*, a fortified town of Germany, capital of Rhenish Prussia, at the confluence of the Moselle and the Rhine, 49 mi. s. s. e. of Cologne. The Moselle here is spanned by a stone bridge of fourteen arches, dating from the Middle Ages. The city is strongly fortified, and on the opposite side of the Rhine is the strong fortress of Ehrenbreitstein. Its industrial products include cigars, machinery, champagne, wines and pianos. Population in 1910, 56,478.

Cobourg, *ko'burg*, a port of Canada, in Ontario, on Lake Ontario, 69 mi. n. e. of Toronto. The leading industries are car works, woolen and rolling mills and matting factory. The post-office, town hall, armories, collegiate institute, asylum for the insane and several fine churches are noteworthy buildings. Beautiful parks, wide streets and pleasant location make it a favorite summer resort. Population in 1911, 5074.

Co'bra or **Co'bra de Capel'lo**, a poisonous snake, of which there are six or seven species, found in southern Asia and Africa. It is called *spectacled snake* from a singular marking on the back of the neck. So exceedingly poisonous is its bite that in numerous instances death has followed within a few minutes, and under ordinary circumstances, where prompt measures have not been taken, a few hours is the longest time a person can expect to live. In India thousands of natives lose their lives yearly through cobra bites. It is probably the most deadly serpent known and does more damage than any other. The cobra is sometimes six feet in length, and when angry it raises its head and about a third of its body, swells its neck into a wide hood and assumes a very terrifying appearance. Its food consists of small reptiles, birds, frogs and fishes. See ASP; ADDER; VIPER.

Coburg, *ko'boorg*, a town of Germany, capital of the duchy of Saxe-Coburg-Gotha, 106 mi. e. by n. of Frankfort-on-the-Main. The principal buildings are the palace of the duke of Saxe-Coburg-Gotha, and on an eminence overhanging the town the ancient castle of the dukes of Coburg, in which are still shown the rooms

occupied by Luther during his concealment here, with his bedstead and pulpit. Coburg has various manufactures, also extensive breweries. Population in 1910, 23,789.

Coc'a, a South American plant. The leaf, mixed with finely powdered chalk, is chewed by the inhabitants of countries on the Pacific side of South America. It has effects somewhat similar to those of opium. A small quantity of it enables a person to bear up against fatigue even when receiving less food than usual; and it prevents the difficulty of breathing felt in climbing high mountains. Cocaine, a crystalline alkaloid, is prepared from the leaves. See COCAINE.

Cocaine, *ko ko'in*, a white crystalline substance prepared from coca leaves. When injected beneath the skin or in contact with the mucous surfaces, it produces insensibility, and accordingly it has been used extensively by dentists and oculists in deadening the sensibility to pain during minor operations. Cocaine has a quieting and restful influence, but its use tends to breed a dangerous habit, as does the use of opium.

Coc'culus or **Fish Berry**, the name given to the fruit of certain climbing plants of the East Indies. The leaves are heart-shaped and the flowers small. The fruit contains a very poisonous quality, which acts in a way similar to strychnine. In India the berries are thrown into the rivers, where fish abound, so as to stupefy them and enable the fishermen to catch them easily. The berries are also used medicinally for various purposes, but care is necessary in order that they do not poison.

Coccus, *kok'kus*, a genus of scale insects. The males are elongated, have large wings and apparently no means for sucking, but the females are rounded or oval, about an eighth of an inch in length, have no wings and possess a beak or sucker by which they take up the juices of plants. At a certain time the females attach themselves to a plant. Here they lay their eggs and die, the bodies of some species drying up and forming habitations for their young. While some of these insects are garden and hothouse pests, others are of great value; for example, kermes, cochineal and gum lac are either perfect insects dried, or the dried secretions which the insects have formed.

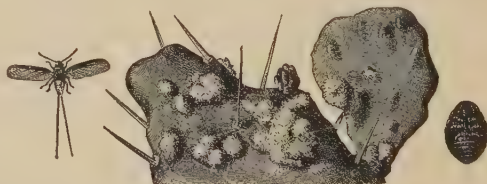
Cochabamba, *ko cha bahm'ba*, the capital of a province of the same name in the interior of Bolivia, situated in a fertile valley 8435 feet above sea level. It is a pleasant place of residence.

The trade is mostly in Peruvian bark and corn. The manufactures are cotton and woolen goods, and earthenware. Population in 1909, 24,512.

Cochin, *ko cheen'* or *ko'chin*, a seaport of the Malabar district, Madras, British India. Cochin was one of the first places in India visited by Europeans. In 1502 Vasco da Gama set up a factory, and soon after Albuquerque built a fort. In 1663 the place was taken by the Dutch and in 1796 by the British. Cochin has a safe harbor, a citadel and an arsenal, and it is one of the chief cities on the coast for shipbuilding and commerce. Population in 1911, 19,300.

Co'chin-Chi'na, a French possession, forming part of the peninsula of southeastern Asia, between Cambodia and Annam on the north and the China Sea. The country is traversed by the Mekong, the deposits of which have produced an exceedingly fertile soil. In the low and wet grounds much rice is grown. In the more elevated districts are grown tobacco, sugar cane, maize, indigo and betel. Among the other products are tea, gums, coconut oil, silk, spices. The natives excel in the use of wood, of which their temples and tombs are built. Population in 1906, 2,870,514; area, 22,000 sq. mi.

Cochineal, *koch'i neel*, a dyestuff, consisting of the dried bodies of a species of insect, a native



COCHINEAL INSECTS ON CACTUS
Male and female.

of the warmer parts of America, particularly Mexico. The insects, which are found living on a species of cactus, are brushed softly off, and are killed by being placed in ovens or dried in the sun. A pound of cochineal contains about 70,000 bodies. The finest cochineal is prepared in Mexico, where it was first discovered. Cochineal produces crimson and scarlet colors and is used in making carmine and lake.

Cochrane, *kok'ran*, THOMAS, Tenth Earl of Dundonald (1775-1860), a British naval officer, born in Scotland. At the age of eighteen he embarked in his uncle's ship, *The Hind*, and soon distinguished himself by his daring and gallantry. In 1800 he was placed in command of a ship, and during the years that followed he made many daring captures and performed

Cockatoo

Some remarkable exploits in cutting out vessels, storming batteries and destroying signals. On his return to England in 1806 he entered Parliament, but he made himself unpopular by his exposure of the abuses that existed in the navy. In 1818 he took service in the navy of Chile, and his exploits were of much service to that country in its struggle for independence. After leaving Chile he served for a time in the Greek navy, but in 1831 he returned to England, where he was restored to his old rank and honors.

Cockatoo', the name of a number of climbing birds belonging to the parrot family, or, as some



COCKATOO

naturalists consider, forming a group by themselves. They have large, hard bills, crests capable of being raised and lowered at the will of the bird, tails somewhat longer than those of the parrots, and long wings. Most of the cockatoos are white in plumage, though some of them are tinged with yellow or red. Their home is in Eastern Archipelago and Australia, where they live on roots, fruits, grain and insects. They can be easily tamed and are often kept in captivity, where some learn to speak a few words.

Cock'chafer, a species of beetle, remarkable for the fact that it exists four or five years in the larval stage, during which time it preys upon the roots of grass and stalks of corn. In its adult stage it is about an inch long and is black in color. As it usually comes from the ground about the beginning of May, it is called the *May bug* or *May beetle*. It is destructive to leaves of various trees.

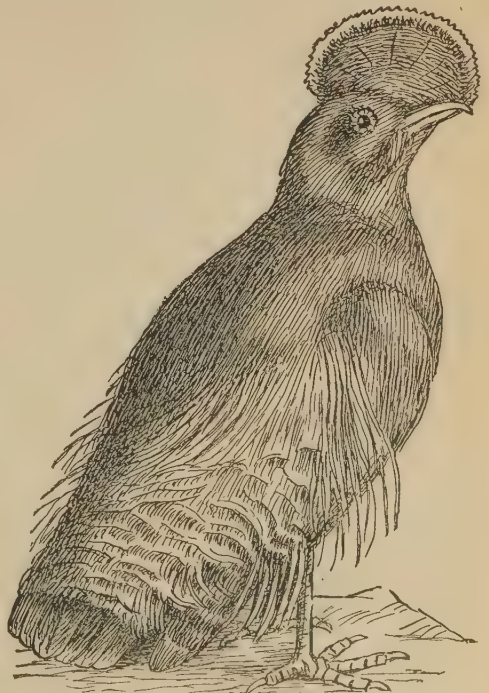
Cockfighting, an amusement practiced in various countries, first, perhaps, among the Greeks and Romans. At Athens there were annual cockfights, and among the Romans quails and partridges were also taught to fight. It was long a favorite sport with the British, and the training, dieting and breeding of cocks

Cock of the Rock

for fighting was the subject of many treatises. The cruelty of the sport led to its being discontinued among the better classes of people, and now it is prohibited by law throughout England and in most of the states of the United States.

Cockle, *kok'l*, a name for bivalve mollusks common on the sandy shores of the ocean and much used as food. The two valves of the shells are nearly equal and have two small teeth, one on each side near the beak, and two larger remote teeth, one on each side.

Cock'lebur or **Clot'bur**, a troublesome weed, of which three species are known in the United States. The burs, which are hard and covered with hooked prickles, are about an inch long, and as a number of these are borne on every plant the weed is a great nuisance in pastures or ranges where cattle or sheep feed. It is difficult to get them out of the wool of the sheep after they once are imbedded there, and, accordingly, efforts are always made to exterminate the weed in wool-raising districts. The plant dies to the ground every year; so it is not difficult to control its growth, if the plants are destroyed each year before the seed ripens.



COCK OF THE ROCK

Cock of the Rock, a showy South American bird, related to the bellbird. It is of a rich

Cock of the Wood

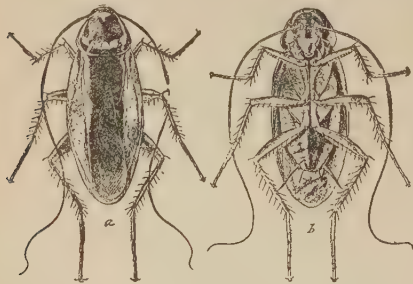
orange color and has a beautiful crest. The skins of these handsome birds have a high value in the market. The bird lives principally upon the ground near rocky streams and builds its mud nests upon the rocks.

Cock of the Wood. See CAPERCAILZIE.

Cock'ran, WILLIAM BOURKE (1854-), an American lawyer, orator and statesman, born in Ireland. He was educated in Ireland and in France, emigrated to the United States in 1871, taught school for a time and then became a lawyer. He soon attained prominence in Democratic politics, and at the national Democratic convention of 1884 he won a national reputation by a noteworthy speech opposing the nomination of Grover Cleveland for president. He was elected to Congress in 1887 and again in 1891. He temporarily abandoned the Democratic party in 1896, because of the money issue, but returned to it in 1900, being in favor of anti-imperialism. He was again elected to Congress in 1904 and served until 1909.

Cock'rell, FRANCIS MARION (1834-), an American soldier and statesman, born in Johnson co., Mo. He graduated at Chapel Hill College, studied law and began practice at Warrensburg, Mo. He entered the Confederate army at the opening of the war and became brigadier-general. He was one of the leading Democrats in the United States senate from 1875 to 1905. From 1905 to 1910 he was a member of the Interstate Commerce Commission, and in 1911 he was commissioner to settle the boundary dispute between Texas and New Mexico.

Cock'roach, a genus of insects having an oval, elongated, flattened body, which is smooth



COCKROACH

a, view from above; b, view from below.

on its upper surface. The males have parchment-like wing covers, and the wings of the females are imperfectly developed. They are exceedingly agile in the night time, and are troublesome in houses, bakeries and wherever food is plentiful, as they eat all kinds of provisions.

Cocoanut

They conceal themselves in cracks and crevices, and very frequently find their way through water and steam pipes into all rooms of a house. The black croton bug breeds in water pipes and is sometimes a great nuisance. The cockroach, however, is a great enemy of the bedbug. Each female lays about thirty eggs in each of two compartments of a small case, which she carries about with her for seven or eight days. The young when hatched are nearly the same form as their parents, except that their wings are not well developed. There are about 1000 species known.

Cocoa, *ko'ko*. See CACAO.

Cocoanut, *ko'ko nut*, an oval, woody fruit, from three to eight inches in length, covered with a thick, stringy husk and holding, inside, a firm, white, fleshy kernel. Within, the fruit is hollow, or partially filled with *milk*, a sweet and watery liquid of a whitish color. The thick husk, which protects the fruit, aids in spreading the tree among the islands where it is native, because the nut floats readily and may be carried long distances without injury. The cocoanut is the fruit of a palm which grows a straight, naked trunk from forty to sixty feet in height. The summit is crowned by feather-like leaves, among which the nuts hang in clusters of a dozen or more. The cocoanut forms a large part of the food of the islanders, who eat it as it comes from the tree, either ripe or green. A large quantity of oil is obtained by pressing the fruit, and this is known as cocoanut butter, which is exported and used in the manufacture of marine soap, in making stearin candles and for numerous other purposes. The cabbage-like bud at the top of the tree is boiled and eaten by the natives. From the sap a beverage is made which, when fermented, is called palm wine, and, when distilled, is known as *arrack*, a very strong liquor. But the usefulness of the cocoanut tree does not end here. The natives use the leaves to thatch cottages, and from the fibers they make mats, cordage, baskets, sacks and other useful articles. The shells are made into beautiful cups, ladles and other ornamental utensils. From the trunks boats are made, or timbers for the construction of houses. The tree, which is a native of Africa, the East and West Indies and South America, is now grown almost everywhere in tropical countries and is one of the most useful trees in the world. It begins to bear when about ten years of age and continues to produce from fifty to one hundred years without special attention. See COIR.

Cod

Cod, an important family of sea fishes, consisting of two groups, the shore cod and the deep sea cod. Shore cod are confined to the temperate zones, but deep sea cod have a much wider range. The common cod, which constitutes the well-known food fish, has a slightly flattened body which tapers abruptly to the tail. It reaches maturity in about three years, but it is of



COD

sufficient size to be marketable when two years old. When full-grown, the fish weighs from twelve to twenty pounds, though larger specimens are sometimes taken. The cod spawns in February, and the best months for fishing are October, November and December. The most noted fisheries are the Grand Banks, off the coast of Newfoundland.

The fish are caught by hook and line. The fishermen go out in schooners, to each of which two or more small boats are attached. When it reaches the fishing grounds, the schooner anchors, and the fishermen put out long lines called *trawls*, to which are attached at frequent intervals shorter lines bearing hooks. A good-sized schooner will put out lines containing from 10,000 to 15,000 hooks. After the trawls have been set the fishermen go along the lines in their small boats and haul in the fish that have been caught. When brought to the schooner, the fish are immediately dressed, split open and salted. The livers are saved, as from them the remedy, cod-liver oil, is obtained. As soon as the schooners receive a load they return to port, where the fish are stretched on platforms and exposed to the sun and air, and are dried and salted. The cod is the most important food fish taken off the eastern coast of North America.

Codex (trunk of a tree, or tablet), a name first applied to books or tablets made by laying sheets one on another and then folding and stitching them, but the word is now used with reference to the original manuscripts of the whole or parts of the Bible. These codices were written on paper or parchment, with often three or four columns on a page, though later there was but one. Much work was done by the monks in illuminating or decorating these pages. The early manuscripts had neither

Cody

punctuation, accent nor word divisions. The *Codex Alexandrinus*, a manuscript in the British Museum, of great importance in Biblical criticism, is written on parchment and belongs probably to the latter half of the sixth century. It contains the whole Greek Bible (the Old Testament being according to the Septuagint), together with the letters of Bishop Clement of Rome, but it lacks parts of *Matthew*, *John* and *II Corinthians*. The Patriarch of Constantinople, who in 1628 sent this manuscript as a present to Charles I, said he had received it from Egypt (whence its name). See BIBLE.

Codling Moth, a small moth whose larva is the familiar apple worm. The eggs are laid on the leaves or on the forming fruit, and when the grubs appear a few days later, they eat their way into the tiny apples at the point where the flower has fallen off. When a larva has reached its growth it emerges, seeks a sheltered place in a crevice of the bark or on the ground, and spins its cocoon. In many localities the moth appears within a few weeks, and a second brood of grubs is ready for the late crop of apples. The codling moth is the most destructive of apple pests, the estimated damage in the United States being about \$10,000,000 yearly. The best remedy is a thorough spraying with an arsenic solution just after the blossoms fall, and a second spraying about three weeks later. The poison should fall on the upturned flower ends of the little apples, for the worms must be killed before they have a chance to burrow in the fruit. When wormy apples fall to the ground they should be disposed of so as to kill the larvae, and as many of the cocoons as possible should be collected and destroyed before the moths emerge.

Cod-liver Oil, an oil extracted from the livers of different species of cod. It is a pale yellow oil, of very disagreeable odor and taste. It is obtained by pressing it from the livers in a cold state, or by heat. It is easily digested, and if not taken in too large quantities, is considered an extremely valuable remedy in all wasting diseases. On account of its disagreeable taste, it is administered in capsules and various other forms. The milky mixture, known as *emulsion*, consists of a preparation of cod-liver oil with other remedies. This oil is obtained in Norway, the United States and Canada.

Cody, WILLIAM FREDERICK (1845-), better known as "Buffalo Bill," was born in Scott co., Iowa. He spent the early part of his life among the Indians on the western frontier,

until the Civil War broke out, when he offered his services as a Union scout. He rendered valuable service during the war to several commanders. Cody was a member of a camp of United States troops which protected the laborers during the construction of the Union Pacific railroad, and he took the contract to supply the entire force with fresh buffalo meat for a certain period; hence his sobriquet of "Buffalo Bill." Later, he collected a band of indians, cowboys, rough riders, unbroken bronchos and a small herd of buffalo, and commenced a series of exhibitions in the principal cities of America. The show is known as the "Wild West Show." He made several tours of Europe with his exhibition.

Coelenterata, *se len'te ra'tah*, the next to the lowest branch of the animal kingdom, including many-celled animals, all of which are very simple organisms, which have no distinct body cavity and no distinct circulatory system. They have a body cavity in which food is digested and from which it is carried to all parts of the body through branches of the cavity. These animals are more or less symmetrical, their parts radiating from a center, resembling in this respect the echinodermata. Peculiar shining organs, or thread-cells, are located in the tentacles of most of the animals. The tentacles are grouped around the mouth, and though sometimes few, they are in other species hundreds, in number, and are long and trailing. By means of these tentacles food is captured and stunned or paralyzed by the stinging cells. Nearly all coelenterata are marine animals, and two distinct types are known: one, the free-swimming, bell-shaped form, medusa; and the other a more or less cylindrical form, fixed to some support. Some, like the coral animal, build in populous colonies and cover a great area of sea bottom. In color many of them are brilliant and show a great variety of delicate shades. See HYDRA, SEA ANEMONE; CORAL; SPONGE.

Coffee, the seed of an evergreen shrub which is cultivated in hot climates and is a native of Abyssinia and Arabia. The name is also applied to the drink prepared from the roasted seeds of this plant. The coffee tree, when wild, grows from fifteen to thirty feet high, but in cultivation it is seldom allowed to exceed six feet. The leaves are dark green and have a waxy appearance on the upper surface. The flowers are white and appear in the axils of the leaves. The fruit is an oval, dark red berry,

resembling a cherry when ripe. Each berry contains two cells, and each cell has a single seed, which forms the coffee nib or bean. These parts of the plant are shown in the color plate. Before roasting, the seed is of a light green color. The tree lives for about forty years and bears fruit from the time it is three years old. The average yearly yield is about one pound of seeds to the tree, though some trees may produce from two to five pounds.

When ripe, the fruit is gathered by placing canvas under the trees and shaking them. The berries are dried in the sun, then passed between rollers, which crush the dried pulp, but do not crush the seeds. The fragments of pulp are then removed from the seeds by winnowing. After being thoroughly dried, the seeds are packed in large sacks, in which they are shipped to market. The brown appearance of the coffee found in retail stores is due to the roasting. Since the aroma developed by the roasting evaporates rapidly, coffee should not be roasted until it is desired for use. The different varieties, such as Mocha, Java and others, may be due to the locality from which the coffee is obtained, the real Mocha coming from Arabia, but they are all liable to be produced from the seeds of the same orchard, the name *Mocha* usually being given to the small beans, and *Java* to the larger ones. Mixtures of these produce other varieties.

Coffee is produced in Arabia and adjoining countries and to a small extent in northern Africa; but the principal producing region is Brazil, which now raises nearly two-thirds the world's supply. Coffee plantations are also maintained in Central America and Mexico, and when carefully cultivated they yield the investors a good revenue. Most of the coffee used in the United States comes from Brazil. Our annual consumption amounts to about 400,000 tons. See INDUSTRIES, Vol. VI.

Cofferdam, a temporary wooden enclosure formed in water, in order to obtain a firm and dry foundation for bridges and piers. It is usually formed of two or more rows of piles driven close together, with clay packed in between the rows. See CAISSON.

Coffeyville, KANS., a city in Montgomery co., 170 mi. s. w. of Kansas City, on the Verdigris River, and on the Missouri Pacific, the Santa Fé and other railroads. There is a large trade with the surrounding country, and especially with Oklahoma. It is in the natural gas region of the southeastern part of the state; it also has extensive strawboard, lumber and flour

Coffin

mills, brick and pottery works and various other factories. Since the recent oil discoveries the place has developed very rapidly. Population in 1900, 4953, and in 1910, 12,687.

Cof'fin, the chest or box in which a dead body is enclosed for burial. Coffins were used by the ancients chiefly to receive the bodies of persons of distinction. Among the Romans it was latterly the almost universal custom to consume the bodies by fire and deposit the ashes in urns (See CREMATION). In Egypt coffins seem to have been universally used in ancient times. They were of stone, earthenware, glass and wood. The ancient Greeks made a coffin of a peculiar kind of limestone, which in a few weeks absorbed the flesh and other tissues of the body. This stone was called *sarcophagus*, and the coffins made from it took the same name. Coffins among Christians were introduced with the custom of burying. Modern coffins are usually made of wood and are sometimes enclosed in a leaden case. Some tribes of indians make basket coffins.

Coffin, CHARLES CARLETON (1823-1896), an American journalist and author, born at Boscawen, N. H. He was a farmer's son and received but little education. After attempting civil engineering and telegraphy, however, he worked his way into Boston journalism by sheer perseverance and became famous during the war as field correspondent for the *Boston Journal*, in which capacity he was present at Antietam, Gettysburg, the Wilderness and many other important battles. In 1866 he continued his reporting in the Austro-Prussian War and on a tour of the world, which permitted his presence at many famous occasions and ended with a stage ride from San Francisco eastward across the plains. He also lectured, served in the Massachusetts legislature and wrote many historical tales, usually for young people. *Following the Flag, Winning His Way, Boys of '76, Building the Nation and Boys of '61* are among his popular books.

Cognac, *ko nyak'*, a town in France, in the Department of Charente, near the River Charente, 22 mi. w. of Angoulême. It is pleasantly situated on a hill, crowned by the remains of an old castle in which Francis I was born. It is famous for the brandy which bears its name and which is exported to all parts of the world. Population, 19,195.

Cohe'sion, that property of matter by virtue of which particles of the same substance stick to one another when brought in close contact. It

Coining

is due to the variation in the force of cohesion that matter exists in its different states—as solid, liquid and gaseous (See MATTER). Cohesion differs from adhesion in that it applies only to particles of the same kind, while adhesion applies to particles of different substances. See ADHESION.

Cohoes, *ko hoze'*, N. Y., a city in Albany co., 9 mi. n. of Albany, at the confluence of the Hudson and Mohawk rivers, on the Delaware & Hudson and the New York Central railroads. The Mohawk here has a picturesque falls, 75 feet high and about 900 feet wide. There is excellent water power, and the city has many extensive industrial establishments. The place was first settled by the Dutch about 1630 and became a city in 1870. Population in 1910, 24,709.

Coin'ing, the art of converting pieces of metal into current coins for the purposes of commerce. Coining is usually done in a government establishment, called a *mint*. Coining is one of the prerogatives of the supreme power in all States, and counterfeiting or otherwise tampering with the coin is severely punished. In the United States the bureau of the mint was established as a division of the treasury department in 1873. It has charge of the coinage for the government and makes assays of precious metals for private owners (See ASSAYING).

In making coins at a United States mint the metal is first melted and cast into a bar. It is then *refined*, after which the alloy is added to harden it, the proportion being one part alloy to nine parts pure metal. The metal is then *cast* into ingots, which are taken to the *rolls*, where they are reduced to bars. The rolling machines are four in number, the rollers being adjustable and the space between them governed by the operator. About 200 ingots are rolled per hour with each pair of rollers. When the rolling is completed the strip is about six feet long. As it is impossible to roll perfectly true, it is necessary to *draw* these strips after they are softened by *annealing*. The drawing benches resemble long tables, with a bench on either side, at the end of which is an iron box screwed to the table. In this are fastened two perpendicular steel cylinders with the space between them equal to the required thickness of the bar. As the bar is drawn between these cylinders they reduce it to an equal thickness.

These strips are now taken to the *cutting* machines, each of which will cut 225 blank coins per minute. The *press* now used consists

of a vertical steel punch. From a strip worth \$1100 about \$800 of blanks will be cut. These are then removed to the adjusting room, where they are adjusted. After inspection they are weighed on very accurate scales. If a blank is too heavy, but near the weight, it is filed off at the edges; if too heavy for filing, it is thrown aside with the light ones to be remelted. The blanks, after being adjusted, are taken to the coining and milling rooms, and are passed through the *milling* machine. The blanks are fed to this machine through an upright tube, and as they descend are caught upon the edge of a revolving wheel and carried about a quarter of a revolution, during which the edge is compressed and forced up. By this apparatus 560 dimes can be milled in a minute; for large pieces the average is 120. The massive but delicate *coining* presses coin from 80 to 100 pieces a minute. These presses are attended by women. After being stamped, the coins are taken to the coiner's room. The light and heavy coins are kept separate in coining, and when delivered to the treasurer they are mixed in such proportions as to give him full weight in every delivery. By law, the deviation from the standard weight for gold coin must not exceed the one-hundredth part of an ounce to \$5000, and for silver coin, two-hundredths of an ounce to \$1000. See MINT; MONEY.

Coir, *kwaahr*, cocoanut fiber, fiber from the husk of the nut, from which are manufactured matting, bagging, ropes and cables. Coir cordage, because it lasts well in salt water, and also because it is light, strong and elastic, is preferable in many respects to ropes of hemp. Mats and matting are now largely made of coir, which is also used in coarse brushes, for stuffing mattresses and for other purposes.

Coke, a variety of charcoal, made by burning bituminous coal with a limited supply of air. The coal is usually burned in a brick or stone kiln, called an oven. The coal is put in through an opening at the top of the oven, and the coke is taken out at the bottom. A ton of coal will produce about two-thirds of a ton of coke. Coke is also formed as a by-product in the manufacture of illuminating gas. Gook coke has an iron gray color, is hard, porous and brittle. It is almost pure carbon and is extensively used in smelting iron and other metals, since the sulphur contained in the coal injures the metal. Coke is also used to some extent as a fuel for heating purposes. It is manufactured in large quantities in England and in

western Pennsylvania, West Virginia, Alabama and Tennessee in the United States.

Coke, SIR EDWARD (1552-1634), an eminent English lawyer. He was chosen recorder of the cities of Norwich and of Coventry, knight of the shire for his county and attorney general. As such, he conducted the prosecutions for the crown in all great state cases. In 1613 he became chief justice of the Court of King's Bench, but because he opposed James I and supported liberal measures in Parliament, he was in 1621 committed to the Tower and soon after expelled from the privy council. In 1628 he was chosen member for Buckinghamshire and was one of the chief authors of the Petition of Right. On the dissolution of the Parliament he retired to his seat in Buckinghamshire, where he died. His principal works are legal text-books of the highest value, among them *Coke upon Littleton; or the First Institute*, and *The Complete Copyholder*.

Co'la-nut. See KOLA-NUT.

Colbert, *kole bair'*, JEAN BAPTISTE (1619-1683), a French statesman and financier. Mazarin, in whose service Colbert had been for some years, recommended him at his death to Louis XIV, who made him comptroller general of finance. His services in the introduction of reforms were of inestimable value to France. He greatly increased the revenues of the country, patronized science and literature, and promoted commerce and manufactures. He may also be regarded as the founder of the French navy.

Colburn, *kole'burn*, WARREN (1793-1833), an American mathematician, born at Dedham, Mass., and educated at Harvard College. While a student at Harvard, he planned a work on elementary arithmetic, which was published under the title, *First Lessons in Intellectual Arithmetic*. The work was an entirely new departure and gained for its author more than a national reputation. It has been in continuous use in the public schools from its publication to the present time and has been translated into several European and oriental languages.

Colchester, *kole'ches ter*, a borough of England, in the county of Essex, 52 mi. by rail n. e. of London. It has a good coasting trade and employs a great number of small craft in the oyster fishery. It is a place of great antiquity, there being no place in the kingdom where so great a quantity and variety of Roman remains have been found as here. Population in 1911, 43,500.

Colchicum

Colchicum, *kol'kik kum*, a genus of plants, allied to the lilies. The meadow saffron is a bulbous-rooted, stemless, perennial plant which grows in various parts of Europe. From a small corm or bulb buried about six inches deep and covered with a brittle brown skin, there rises in the early autumn a tuft of flowers having much the appearance of crocuses, flesh-colored, white or even variegated. They soon wither, and the plant disappears till the succeeding spring, when some broad leaves are thrown up by each corm, along with a triangular, somewhat oblong seed vessel. The plant is acrid and poisonous.

Cold Harbor, BATTLES OF, several battles of the Civil War, fought between June 1 and June 12, 1864, between an army of 120,000 Union troops commanded by Grant and a force of 100,000 Confederates commanded by Lee. Lee had occupied Cold Harbor and was entrenched when an advance guard of the Union force reached the place on June 1. The Federals made an ineffectual assault upon the works and then retired until June 3, when in the early morning several attacks were made along the whole Confederate line. In the last of these, which lasted less than thirty minutes, the Union forces were hurled back in confusion, with a loss of nearly 7000 men, ten times as great as the loss suffered by their opponent. For seven days desultory fighting continued, but on June 10 General Grant began a flank movement toward Richmond. The Battles of Cold Harbor are considered by critics to have constituted the most serious mistake in Grant's career. He himself once said, "No advantage whatever was gained to compensate for the heavy losses. Indeed, the advantages, other than those of relative losses, were on the Confederate side."

Cold Storage, a system of preserving meats, vegetables and other perishable articles, by keeping them in rooms whose temperature is reduced nearly to the freezing point. Cold storage is used in connection with the transportation of fruit, butter, meats and produce, in breweries and in large hotels and restaurants, and for protecting furs in summer. See REFRIGERATION.

Coldwater, MICH., the county-seat of Branch co., 125 mi. s. w. of Detroit, on the Coldwater River and on the Lake Shore & Michigan Southern railroad. The river furnishes good water power and the city contains manufactures of shoes, cement, flour and other articles. It is the seat of the state school for

Coleridge

dependent children. Coldwater was settled in 1830 and was made a city in 1862. Population in 1910, 5945.

Cold Wave, a wind or anti-cyclonic condition of the atmosphere, which produces a sudden fall of temperature of several degrees. In the United States cold waves usually come from the northwest, but in some localities they may come from other directions. They are generally characterized by a high barometer and a clear atmosphere. Sometimes they extend so far south in the spring as to cause great damage to the fruit crop. The most extensive cold waves are caused by a large area of high pressure, which seems to cover the earth with a blanket of cold air. The Weather Bureau is able to predict cold waves twenty-four or thirty-six hours in advance of their arrival. The signal indicating their approach is a white flag with a large black square in the center. See CLIMATE; WEATHER BUREAU.

Cole, THOMAS (1801-1848), an American landscape painter, born in England. His youth was spent in Ohio, and later he went to New York to study. His pictures are mostly American scenes, among them being the *Voyage of Life*, *Course of Empire* and *White Mountains*.

Coleop'tera. See BEETLE.

Cole'ridge, SAMUEL TAYLOR (1772-1834), an English poet, born at Ottery Saint Mary, in Devonshire. From his childhood he was a voracious reader, and such books as the *Arabian Nights*, which he read as a child, undoubtedly influenced the course of his genius. He entered Cambridge University, but did not remain to graduate, and shortly after leaving the university he became interested with Southey in a scheme for founding an ideal community on the banks of the Susquehanna. As no unmarried people could join this community, Coleridge and Southey married in 1795, sisters, but their scheme went no further than this, as they had no funds to carry it out. In 1796 Coleridge took a cottage at Nether Stowey in Somersetshire, and here he lived for two years as a neighbor of Wordsworth and his sister. The two young men, with Dorothy Wordsworth, took long rambles, and together they planned the volume *Lyrical Ballads*, which appeared in 1798. Coleridge's contribution to this was *The Ancient Mariner*. In the same year he traveled in Europe with Wordsworth, and on his return he settled in Keswick. In 1804 he went to Malta, thinking to gain some relief from the rheumatism, but returned two years later without having bene-

fited his health. To gain escape from his rheumatic pains, he had taken to opium, and the habit rapidly mastered him. Unable to fight against it alone, he lived from 1816 until his death chiefly with Doctor Gillman in London, leaving his family to the care of Southey. He was to a certain extent successful in mastering the habit, but it had seriously impaired his ability to work and his powers of concentration, never great, and he produced little that was noteworthy during his later years. Coleridge's conversational abilities were great, however, and during these years in London he was the center of a group of young men who met once a week to hear him talk.

All the poetry for which Coleridge is most celebrated, *The Rime of the Ancient Mariner*, *Christabel* and *Kubla Khan*, was written in a little over a year. Few poets have attained so high a place with so small a body of work; yet the wonderful melody of his verse, its imagery, its fancy, its suggestiveness, entitle him to rank with the truest of English poets. His prose writings, while less permanently important than his poetry, were noteworthy in their day and had a great influence on his successors. Of especial importance was his *Lectures and Notes on Shakespeare*, which may be regarded as the basis of modern Shakespeare study.

Cole'ridge-Tay'lor, SAMUEL (1875-1912), a modern English composer, of African descent. He studied at the Royal Academy from 1890 to 1896, achieving distinction as a composer. His most important work was a musical setting for Longfellow's *Hiawatha*. He composed music for some of Stephen Phillips' dramas, and wrote a sacred cantata, *The Atonement*, besides numerous songs, ballads and orchestral compositions.

Colfax, kole'faks, SCHUYLER (1823-1885), an American statesman, born in New York City. He became prominent as a Whig editor in Indiana and was elected to Congress in 1854, serving until March, 1869. From Dec. 7, 1863, to March 4, 1869, he was speaker of the house, and was elected on the Republican ticket vice-president of the United States in 1868. During his incumbency of that office he was accused of complicity in postal frauds and the Credit Mobilier scandal, but nothing was proved against him.

Coligny, ko le nye', GASPARD DE (1517-1572), a French admiral and Huguenot leader, who won distinction in the wars of Francis I and Henry II. He was made admiral in 1552. After the death of Condé, he became commander

in chief of the Huguenots, and on the night of Saint Bartholomew's Day he was put to death. See BARTHOLOMEW'S DAY, SAINT.

Colima, ko le'ma, a town of Mexico, capital of a state of the same name, situated in a fertile plain at an elevation of 1400 feet, with the volcano of Colima, which is 13,000 feet high, 40 miles distant. The port of the city is 30 miles southwest. Population about 25,000.

Col'lege, in a general sense, a body or society of persons invested with certain powers and rights, performing certain duties, or engaged in some common employment or pursuit. In the United States and England some societies of physicians are called colleges. The most familiar application of the term, however, is to a society of persons engaged in the pursuits of literature, including the professors, lecturers or other officers, and the students. As applied to an educational institution the name is somewhat loosely used. The higher class of colleges includes those in which the students engage in study for the purpose of taking a degree in arts, medicine or other subjects, and are connected with, or have more or less the character of, universities. The early history of these institutions is somewhat obscure; the probability is that they were originally founded in the various universities of the Middle Ages. Hostels, or boarding houses, were provided, principally by the religious orders for the benefit of those of their own fraternity, in which the scholars lived under a certain superintendence, and the endowment of these hostels by charitable persons for the support of poor scholars completed the foundation of a college. Out of this has developed the modern college, of which there are about 500 in the United States. See UNIVERSITY.

Col'lie, a variety of dog especially common in Scotland, because of its intelligence of



COLLIE

much use to shepherds. The collie will take a flock of sheep to pasture, keep them together,

protect them from wolves and bring them all back safely at night. This dog is of medium size and varies much in coloring. Black and white collies are common, and those with black bodies and tan-colored legs are thought to be particularly handsome. The collie's head is somewhat fox-shaped, his ears are erect, but have drooping points, and his tail is rather bushy, with a strong curl upward.

Collier, *kol'yur*, JOHN PAYNE (1789-1883), an English Shakespearean critic. In 1831 his best work, the *History of English Dramatic Poetry, and Annals of the Stage*, was published. Between 1842 and 1844 he published an annotated edition of Shakespeare in eight volumes, and in 1852 he brought out the notes and emendations to Shakespeare which he professed to have discovered in the margin of an old folio. These marginal notes were afterward proved to be forgeries.

Col'lins, WILLIAM (1721-1759), an English poet. While studying at Oxford he wrote his Persian *Eclogues*, and in 1746 he published his *Odes, Descriptive and Allegorical*. Although this volume was unsuccessful, it contained some lyrics which entitle Collins to high rank among eighteenth century poets. Best known of his poems are the *Ode on the Passions*, the *Song from Cymbeline* and the ode beginning "How sleep the brave who sink to rest."

Collins, WILLIAM WILKIE (1824-1889), a well-known English novelist. He was a friend of Dickens, who had much to do with his decision to devote himself to literature rather than to the law, for which he had been educated. Among his best-known works are *Antonina*, *After Dark*, *The Woman in White*, *The New Magdalen*, *The Evil Genius* and *The Moonstone*.

Collo'dion, a substance prepared by dissolving pyroxiline (gun cotton) in ether, or in a mixture of ether and alcohol, which forms a useful substitute for adhesive plaster in the case of slight wounds. When the fluid solution is applied to the cut or wound, it immediately dries into a semi-transparent, tenacious film, which adheres firmly to the part, and under it the wound or abrasion heals without inflammation. In a slightly modified form collodion is also employed as the basis of a photographic process called the *collodion process*. The common small toy balloons are made of collodion. A solution of it is poured into a flask, which is then rolled around so that the collodion will form in a coating of equal thickness over the inside;

then the air is exhausted from the flask and the collodion film pulls off and is easily removed.

Coll'yer, ROBERT (1823-1912), a Unitarian clergyman, born in England. He attended a night school for two winters and at the age of fourteen was apprenticed to a blacksmith. In 1850 he came to this country, worked as a hammer maker in Shoemakertown, Pa., and preached on Sundays. In 1860 he organized Unity Church of Chicago, of which he was the pastor until 1879, when he removed to New York to assume charge of the Church of the Messiah.

Colmar' or Kolmar', a city of Germany, in Upper Alsace, 39 mi. s. s. w. of Strassburg. It has manufactures of printed goods, calicoes, textiles, machinery and silks, besides cotton mills and tanneries. It was united to France in 1697 by the Peace of Ryswick, but surrendered to Germany by the Treaty of Versailles in 1871. Population, 36,800

Col'occa'sia, a genus of plants, native of the East Indies, whose tubers contain much starchy matter, which is used as a food after the acrid juice has been separated by boiling or washing. In the Pacific Islands the colocasia is called *taro*; in Japan, *satoimo*; in China, *yu-tao* and in Central America, *oto*. In the Sandwich Islands the natives eat the roasted leaves as well as the tubers.

Cologne, *ko lone'*, a city of Rhenish Prussia, on the left bank of the Rhine, forming, in connection with Deutz, a fortress of the first rank. There are many fine old buildings, as well as excellent modern ones; the churches, in particular, are interesting. The most important edifice of all is the cathedral, begun in 1248, one of the finest and largest Gothic structures in Europe. The manufactures embrace sugar, tobacco, glue, carpets, leather, machinery, chemicals, pianos and the celebrated *eau de Cologne*, or Cologne water. Cologne was one of the most important members of the Hanseatic League and one of the most populous cities of Europe until the sixteenth century, when a decline set in. With the nineteenth century, progress began. Population in 1910, 516,167.

Cologne Cathedral, one of the finest specimens of Gothic architecture in the world. It was begun in 1248 and was not completed until 1880. It is in the form of a cross 444 feet long, and has two enormous towers, the loftiest church towers in the world, each 512 feet high. The roof is 200 feet high and has a central tower 350 feet high. In the interior are pillared aisles, beautiful altars, mosaics, paintings,

Cologne Yellow

statuary and magnificent windows of stained glass. In the treasury are kept very many valuable jewels, precious stones and many sacred relics.

Cologne Yellow, a pigment consisting of two parts yellow chromate of lead, one of sulphate of lead and seven of sulphate of lime, or gypsum. It is prepared by precipitating a mixture of nitrate of lead and nitrate of lime with sulphate of soda and chromate of potash.

Colombia, a republic in the northwestern part of South America; bounded on the n. by the Caribbean Sea, on the e. by Venezuela, on the s. and s. e. by Ecuador and Brazil and on the w. by the Pacific Ocean and the Republic of Panama. The boundaries toward the southeast are not yet definitely settled, parts being claimed by Ecuador, Peru and Brazil. The area is estimated at 513,000 square miles, or a little less than the combined area of California, Oregon and Texas.

SURFACE AND DRAINAGE. The surface is very mountainous. The Andes, entering from Ecuador, divide in southwest Colombia into three branches, namely, the west range; the central range, which has the highest peaks in Colombia, including the volcanoes Tolema, 18,000 feet high, Huila and Purace; the eastern range, a continuation or branch of the central, from which it is separated by Magdalena River. This chain divides in the north, the eastern extending into Venezuela, and the western extending northward, joining the Sierra Nevada de Santa Marta near the coast. There are many rivers, the chief of which is the Magdalena, which has a length of 1000 miles and is navigable for almost 850 miles. The tributaries are the Cauca and the Atrato, the Meta and the Guaviare, the latter two tributaries of the Orinoco, and the Negro and Japara, both affluents of the Amazon.

MINERAL RESOURCES. Colombia is rich in minerals. The mountainous regions abound in gold and silver. The chief center of gold mining is Antioquia. The annual output of gold and silver amounts to \$4,500,000. Iron, copper, lead and salt are also found to some extent. Emeralds of an exceedingly fine quality are mined in the State of Boyaco.

CLIMATE. The climate varies in different parts. The coast plains are generally hot and damp, while the central plateaus and high tablelands have a pleasant and healthful climate and abundant rains. In the southwest portion the plains are exceedingly dry.

Colombia

AGRICULTURE. Agriculture is the chief industry of Colombia. Coffee, tobacco and sugar cane are grown in the hot regions, and wheat, corn and barley in the more temperate parts. In the deep forests vegetation is very luxuriant. The banana tree is found in most parts, and the fruit is an important article of export.

TRANSPORTATION. There are not many railroads, owing to the mountainous character of the country. In 1901 there were 400 miles in operation. The absence of good roads is partly compensated by the many navigable rivers. Many steamboats ply the Magdalena.

INHABITANTS AND LANGUAGE. Formerly Colombia was inhabited by indians, and in the southern cordilleras the forests are still inhabited by uncivilized tribes. The civilized population is found in the northern and western portions. The majority of the people are descendants of the Spaniards, and there are also many negroes. The language spoken almost everywhere is Spanish.

EDUCATION. Education is largely maintained by the state. Besides the public schools, there are a university at Bogota, a national institution for workmen and a school of arts and trades.

GOVERNMENT. Colombia is a republic. The president and vice-president are chosen for six years by an electoral college. There is a council of state of six members. The Congress consists of two houses, a Senate of seven members, and a House of Representatives, containing one member for every 50,000 inhabitants. Each of the eight departments into which Colombia is divided has a governor appointed by the president and an assembly elected by the people.

CITIES. The chief cities are Bogota, Medellin, Cartagena and Barranquilla, each of which is described under its own title.

HISTORY. In 1536 the united forces of the Spaniards overcame the indians who dwelt around this region, and after this Spanish settlements rapidly grew up. In 1740 a viceroyalty under the name of New Granada was formed, comprising the present Colombia. In 1811 an insurrection against Spain broke out, and nine years later independence from Spain was secured. In the same year New Granada and Venezuela united to form the republic of Colombia, and Ecuador joined later; but this union lasted only until 1831, when the republic of New Granada was formed. There followed revolutions and political strife, with frequent changes in the constitution, until 1861, when a federal constitution was adopted and the name was

Colombo

changed to the United States of Colombia. In 1886 the present centralized republic was formed, the states now becoming Provinces. The Province of Panama broke away from Colombia in 1903 and formed a republic. Population, 4,000,000.

Colom'bo, the capital of Ceylon, on the west coast of the island. The city is divided into two parts, the European portion, noted for its beauty, and the native portion, or *Pettah*, crowded and dirty. The city is of great commercial importance, owing chiefly to its immense breakwater, sheltering 500 acres of water. Colombo is the center of the tea and cocoanut industry. Population in 1911, 211,284.

Colon or **Aspinwall**, a port of the Republic of Panama, on the north side of the Isthmus of Panama, at the Atlantic extremity of the inter-oceanic railway and near that of the Panama Canal. Established in connection with the railway, it had an important transit trade before the canal was begun, and since then the place has been entirely transformed, a new town with wide and regular streets having been built on a tract of land reclaimed by the old canal company. There is extensive harbor accommodation. Population in 1910, 19,300.

Col'onies and Col'oniza'tion. The term colony means, strictly, a settlement formed in one country by the inhabitants of another, but now it is used loosely to describe a territory distant from, but dependent upon, another government. So, such a country as Australia, which is a colony in a true sense, is classed with Gibraltar, which is only a military station. The ambition of extending territory, the desire of increasing wealth, and, latterly, the necessity of providing an outlet for the population of European states, have been the chief motives in colonization.

ANCIENT COLONIES. Among ancient nations the principal promoters of colonization were the Phoenicians, the Greeks and the Romans; the greatest colonizers in modern times have been the English and the Spaniards, next to whom are the Portuguese, the Dutch and the French. The Germans have latterly contributed largely to the tide of emigration, particularly in the direction of America; but they have done little directly as colonizers. The Phœnician colonies were partly caused by political dissensions and over-population, but were chiefly commercial, serving as entrepôts and ports of repair for Phœnician commerce along the coasts of Africa and Spain, in the latter of which they

Colonies and Colonization

numbered probably more than two hundred. But it was in Africa that the most famous arose, Carthage, the greatest colonizing state of the ancient world. The Greek colonies, which were widely spread in Asia Minor and the islands of the Mediterranean, on the coasts of Macedonia and Thrace, in South Italy and Sicily, were commonly independent, and frequently soon surpassed the mother states in power and importance. The colonies of Rome were chiefly military, and while the Empire lasted were all in strict subordination to the central government. As the Roman power declined the remains of them amalgamated with the people among whom they were placed, thus forming, in countries where they were sufficiently strong, what are known as the Latin races, with languages (Spanish, Portuguese, French and Italian) which are merely modifications of the old Roman tongue. Before America and the sea route to the East Indies were discovered, the only colonies belonging to European states were those of the Genoese, Pisans and Venetians, in the Levant and on the Black Sea, flourishing establishments on which the mercantile greatness of Italy in those days was largely built.

PORTUGUESE COLONIES. The Portuguese were the first great colonizers among modern states. In 1419 they discovered Madeira, the Azores and the Cape Verde Islands; soon after they reached the Kongo and the Cape of Good Hope, and before 1500 Vasco da Gama had landed at Calicut, in India. The first Portuguese colonies were garrisons along the coasts where traders stopped, but real colonies were established in Ceylon in 1505 and in the Moluccas in 1510. Brazil was discovered in 1499, and it fell to Portugal by the Bull of Demarcation and was colonized about 1530. Bad government at home and the subjection of the country to Spain caused the loss of most of the Portuguese colonies. The Portuguese now possess several territories in India, China and the Indian Archipelago. In Africa they possess the Cape Verdes, settlements along the coast and other islands amounting in area to about 700,000 square miles; but Portuguese influence is really limited to a very small portion of this.

SPANISH COLONIES. Soon after the Portuguese, the Spaniards commenced the work of colonization. In 1492 Columbus discovered the island of San Salvador. Hayti, or San Domingo, Porto Rico, Jamaica and Cuba were soon colonized; before the middle of the sixteenth century Mexico, Ecuador, Venezuela, New

Colonies and Colonization

Granada, Peru and Chile were subdued, and Spain took first rank among the colonizing powers of Europe. But the Spaniards never really attempted to develop the industrial resources of the subject countries. The pursuit of mining for gold or silver occupied the colonists almost exclusively, and the enslaved natives were driven to work themselves to death in the mines. Cities were founded, at first along the coasts, for the sake of commerce and as military posts, and afterwards in the interior. The colonial intercourse with Spain was confined to the single port of Seville, afterward to that of Cadiz. When the power of Spain declined, her colonies in America declared their independence, and Cuba, Porto Rico and the Philippines were ceded to the United States at the close of the Spanish-American War. The Ladrone Islands were sold to Germany in June, 1899, and Spain now owns only a few small places in India and Africa.

DUTCH COLONIES. The hate of Philip II, who excluded Dutch vessels from the port of Lisbon, forced the Dutch to import directly from India or lose the large carrying trade they had acquired. Several companies were soon formed, and in 1602 they were united into one, the Dutch East India Company, with a monopoly of the East India trade and sovereign powers over all conquests and colonies in India. The Dutch rapidly deprived the Portuguese of nearly all their East Indian territories, settled a colony at the Cape of Good Hope (1650), established a West India Company, made extensive conquests in Brazil (1623-1660), which were soon lost, and more permanent ones on some of the smaller West India islands. The growing power of the British and the loss of Holland's independence during the Napoleonic wars were heavy blows to the colonial power of the nation. But the Dutch still possess numerous colonies in the East Indies, among which the more important are Java, Sumatra, Dutch Borneo, the Molucca Islands and part of New Guinea, also several small islands in the West Indies, and Surinam.

BRITISH COLONIES. No other colonizing power of Europe has had a career of such uniform prosperity as Great Britain. The English attempts at colonization began nearly at the same time as the Dutch. After many fruitless attempts to find a northeast or northwest passage to the East Indies, English vessels found their way round the Cape of Good Hope to the East Indies in 1591. The East India Company was established in 1600. The ruin of the Mogul Empire in India after the death of Aurengzebe (1707)

Colonies and Colonization

afforded the opportunity for the growth of British power, as the British and French were compelled to interfere in the quarrels of the native princes and governors. By the victory of Clive at Plassey in 1756, France was practically driven from India, and England laid the foundation of an exclusive sovereignty there. By the middle of the nineteenth century the British territory embraced nearly the whole of India, which was still under the government of the East India Company—a mercantile company, controlled, indeed, by Parliament, but exercising many of the most important functions of an independent sovereignty. On the suppression of the Indian mutiny (1857-1858) the government of India was transferred to the crown by act of Parliament in 1858.

The discoveries of the Cabots, following soon after the voyages of Columbus, gave the English crown a claim to North America, which in the reign of Elizabeth led to colonization on a large scale. Raleigh's settlement on Roanoke Island (North Carolina) in 1585 failed to become permanent, but in 1607 the colonists sent out by the London Company to Chesapeake Bay founded Jamestown in Virginia. The next great settlement was that of the Pilgrim Fathers, who landed Dec. 21, 1620, in Massachusetts Bay. The colonization of New Hampshire, Maine, New Jersey, Connecticut, Rhode Island, Maryland, Pennsylvania, the Carolinas and Georgia followed within a century, and, meanwhile, New Amsterdam was seized from the Dutch, and its name was changed to New York. Colonies were early established in the West India islands; Newfoundland was taken possession of in 1583 and colonized in 1621; Canada was surrendered to Britain by the Treaty of Paris in 1763. In 1764 began the disputes between Great Britain and its North American colonies, which terminated with the acknowledgment of the independence of the United States, Canada still remaining a British dependency.

Australia was discovered in the beginning of the seventeenth century. The first settlements of Britain there were penal colonies, the first being established in New South Wales about 1770. In 1851 the discovery of the abundance of gold in Victoria gave a great impetus to the prosperity of the Australian colonies. In 1874 the Fiji Islands, and in 1884 part of New Guinea, were annexed as crown colonies. In South Africa, Cape Colony, first settled by the Dutch in 1652, became an English colony in 1814, and English influence there has since been steadily

expanding, now extending over a large part of South, East and North Africa. In Europe Great Britain has a few colonies acquired for military reasons—Gibraltar in 1704, Malta and Gozzo in 1800. It is estimated that the existing British colonies and dependencies embrace about one-sixth of the land surface of the globe and nearly the same proportion of its population.

FRENCH COLONIES. France was somewhat late in establishing colonies. Champlain was the pioneer of the French in the exploration of the North American continent and founded Quebec in 1608. Colbert purchased several West India islands, as Martinique, Guadeloupe, Saint Lucia, and sent out colonists in 1664 to Cayenne. In 1670 the East India Company, formed by Colbert, founded Pondicherry, which became the capital of extensive possessions in the East Indies. At the beginning of the eighteenth century France had settlements in Canada, Nova Scotia and Newfoundland and the most flourishing of the West India islands, and she seemed to have a prosperous career before her in India. Before long, however, the rival interests of British and French colonists brought about a conflict, which terminated in the loss of Canada and other North American possessions, as well as many of the West India islands and a large part of India. France has colonial possessions at present in India, Cochin-China and south-eastern Asia, New Caledonia, and other islands in Oceania, in Africa and in the West Indies.

OTHER COLONIES. Of recent years *Germany* has made an effort to take rank as a colonial power and has acquired territories in Africa and in the islands of the Pacific, as well as posts in China. *Denmark's* northern dependencies, Iceland, Greenland and the Faroe Islands, though of considerable extent, are of small value. In the West India islands she has Saint Thomas, settled in 1672, Santa Cruz, purchased from France in 1733, Saint John and some smaller islands. Since 1898 the *United States* has taken rank as a colonizing power, having gained, by the Spanish-American War, the island of Porto Rico in the Caribbean Sea and the Philippines in the Pacific, and since that time other small islands and coaling stations.

Colon'na, VITTORIA (1490-1547), an Italian poet. At the age of seventeen she was married to the marquis of Pescara, to whom she had been betrothed for thirteen years. During his life her poems related mostly to his absences; after his death they were devoted to his memory. She was a friend of Michelangelo, who wrote a

number of sonnets to her. Her most celebrated work is the *Rime Spirituali*.

Colophon, kol'o fon, an ancient Ionian city of Asia Minor, about 8 mi. n. of Ephesus, one of the places that claimed to be the birthplace of Homer, and the native city of other eminent men.

Color, kul'ur, the name used to distinguish the different sensations that lights produced by various rates of vibration give to the eye. White is composed of seven colors, violet, indigo, blue, green, yellow, orange and red. These are known as the *prismatic* colors (See **LIGHT**, subhead *Spectrum*), and all other colors are produced by combinations or modifications of the prismatic colors. The color of bodies is due to their different powers of reflecting light. A red body reflects the red rays and absorbs all the others; a blue body reflects only the blue rays; a green body, the green, and so on. The *primary* colors are those from which all other colors can be made by mixing. They are blue, yellow and red. The remaining prismatic colors are known as *secondary*, because they can be produced by mixing two of the primary colors, as blue and yellow produce green; red and yellow, orange, and blue and red, violet or indigo, according to the quantity of red used. *Complementary* colors are those which, when mixed, produce white; any one of the primary colors is a complementary color when mixed with the other two. In the scientific sense of the word, white and black are not considered colors. A white body reflects all the rays, and the black body absorbs all without separating them. This, however, is only theoretical. In all cases some rays are absorbed and some reflected.

Colorado, kol o rah' do, the **CENTENNIAL STATE**, is situated in the west central part of the United States. It is bounded on the n. by Wyoming and Nebraska, on the e. by Nebraska and Kansas, on the s. by Oklahoma and New Mexico and on the w. by Utah. Its average length from north to south is 380 miles, the breadth of 280 miles, and the total area, 103,948 square miles. Population in 1910, 799,024.

SURFACE AND DRAINAGE. The eastern part of the state, including about one-third of its area, is a treeless plain which rises from an elevation of about 3000 feet on the eastern border to meet the foothills of the Rocky Mountains. This plain is a continuation of the prairie region to the east and also a portion of the Great Central Plain of North America. To

the west of the foothills are the Rocky Mountains, rising from a plateau which occupies about one-third the area of the state. The Main or Front Range, lying on the east, crosses the state from north to south. West of the Front Range are numerous others which extend irregularly across the state, and with the Front Range and their spurs enclose a number of elevated valleys called parks. The most important of these ranges are the Saguache, the Elk and the White River mountains. The parks, known respectively as the San Luis, the South, the Middle and the North Park, are quite level, well watered and fertile. San Luis Park, lying in the south central part of the state, is nearly as large as Massachusetts.

The mountains of Colorado are noted for the large number of lofty peaks and the grandeur of their scenery. Within the state there are more than 200 peaks over 13,000 feet in altitude, and 40 over 14,000 feet. The highest, Mount Blanca (14,464), in the southern part of the state, is, next to Mount Whitney in California, the highest peak in the United States proper. Pike's Peak (14,147) is the most celebrated. The summit is reached by a mountain railway and it is visited by thousands of tourists every summer. Other celebrated peaks are Long's, Evans, Castle and the Mount of the Holy Cross. The mountains contain many deep and precipitous gorges, through some of which railways find their way to the Pacific slope. Some valleys contain columns of sandstone which have been worn into fantastic forms by wind and water. The Garden of the Gods and Monument Park are especially interesting to visitors.

The Great Continental Divide crosses the western part of the state. To the east of this the rivers flow into the Mississippi, and to the west, into the Pacific. In the mountain parks are the sources of the Platte, the Arkansas, the Rio Grande and the Colorado, formed by the Green and the Grand after they enter Utah. The canyons of these streams are noted for their beauty and sublimity (See ROYAL GORGE). Hot springs are found in many localities.

CLIMATE. A diversified surface gives Colorado a varied climate, but pure dry air and abundant sunshine characterize all regions. While the heat of summer is often excessive, prostrations from heat are practically unknown. In the shade the heat is never oppressive, nor are the nights ever sultry. The cool shade and the rapid fall of temperature toward evening

are easily explained. Dry air cools four times as fast as watery vapor; it also permits the heat to radiate freely from the earth, while vapor catches and holds this heat. Again, the capacity of air for heat increases with its density. The atmosphere of the elevated plains is rarified and contains little moisture; hence, it cools rapidly when not exposed to the sun's rays. The rarified dry air also accounts for the fact that neither the heat of summer nor the cold of winter seems as great as the thermometer indicates. The annual rainfall is slight, averaging not more than fifteen inches. The state is a celebrated health resort, especially for consumptives.

MINERAL RESOURCES. The mineral resources of the state are extensive and varied, including large deposits of gold, silver, lead, copper and other metals, extensive coal fields and some oil fields. Mining is the chief industry of the state, and Colorado produces more gold than any other state in the Union. In 1900 the output was \$30,000,000, but the yearly average is now about \$20,000,000. Silver, zinc, iron and lead are also mined in large quantities, while the annual output of coal amounts to 10,000,000 tons. In all, the yearly value of the mineral products is about \$50,000,000. The principal mining centers are Leadville, Cripple Creek, Silverton, Creede and Telluride.

AGRICULTURE. Owing to the light rainfall, many portions of the state are unsuited to agriculture, but since 1890 this industry has grown very rapidly. Over 4,300,000 acres are under cultivation, and wherever water can be obtained the soil yields abundant returns. Irrigation is practiced to a very great extent, and the area of irrigable land is increasing each year. The chief crops are alfalfa, wheat, oats, barley, corn, potatoes and sugar beets. The last constitutes an important agricultural industry, and the yearly output of beet sugar amounts to \$6,250,000. In the mountain valleys, apples and other fruits of the temperate region are grown with the greatest success, and on many of the plains there is an abundance of grass for grazing. In these regions the raising of live stock is carried on successfully. The mountains below the snow line are covered with pine, spruce and fir, which furnish a supply of lumber, and lumbering is an important industry.

MANUFACTURES. Various circumstances have combined to make Colorado one of the leading



GRAND CANYON OF THE COLORADO

One of the world's scenic wonders, painted by nature in marvelous colors beyond the power of the artist to reproduce. At a depth of a mile the Colorado River is seen

Colorado

manufacturing states west of the Mississippi. The value of her manufactures is about \$130,000,000 annually. Smelting and refining take the lead of all manufacturing industries, and many of the other most important manufactures are closely allied with the mining industry—such as brass works, lead, tin and copper works and the manufacture of iron and steel products. Brick of fine quality is made near Denver, and the products of the flour and grist mills are of considerable value. Slaughtering and meat-packing are of increasing importance.

TRANSPORTATION. The state has over 4500 miles of railroads. The first line was built in 1870 and extended from Denver to the Union Pacific at Cheyenne. Numerous lines extend from Denver to the Missouri River, and connect with all of the leading commercial points in the Mississippi Valley, while the Denver & Rio Grande and the Colorado Midland form trunk lines extending westward and connecting with the Union Pacific at Salt Lake City and Ogden. The Denver & Northwestern, now under construction, will soon be completed to the Mormon capital and form a link in a more direct route to the Pacific coast. Several narrow gauge lines are operated in the mountains where standard gauge roads would prove unprofitable. The Santa Fé system and other lines form a connection with New Mexico and the Southwest. Electric lines are found in and about the larger towns, so that the settled portions of the state have good railway facilities. Owing to the mountainous character of the country, the rivers are not navigable.

EDUCATION. The sales and rental from over 3,500,000 acres of school lands form a permanent fund to be expended for public instruction. The state institutions are the University of Colorado at Boulder, the School of Mines and an Industrial School at Golden, the Agricultural College at Fort Collins, the Mute and Blind Institute at Colorado Springs and the Colorado Teachers College. There are, besides, several denominational colleges of high rank.

CITIES. The principal cities are Denver, the capital, Pueblo, Colorado Springs, Leadville and Cripple Creek, each of which is described under its proper title.

HISTORY. The name of the state, taken from that of the Colorado River, signifies *red water*. The country was visited by Spanish adventurers in the sixteenth century, but was not settled. By the Louisiana Purchase the United States gained possession of about half of the

Colorado River

territory of Colorado, and the remainder was acquired from Mexico by the Treaty of Guadalupe-Hidalgo. It was explored by Zebulon Pike in 1806 and by Fremont in 1843. The discovery of gold in 1858 was followed by settlement in the regions of the mines, and Denver and Boulder were established. In 1861 the territory of Colorado was organized from portions of Kansas, Nebraska, New Mexico and Utah, and after two acts for her admission as a state had been vetoed, she finally was admitted in 1876, becoming known as the *Centennial State*. Woman suffrage was adopted in 1893, and a capitol building which cost \$2,500,000 was completed in 1894. The state has generally been Republican in politics, but cast its vote for Weaver, the Populist candidate in 1892, for Bryan, the Democratic free-silver candidate in 1896 and 1900, and for Wilson in 1912.

Colorado, UNIVERSITY OF, an institution of higher learning at Boulder, Colo., incorporated by the territorial legislature in 1861. In 1876 the constitution of Colorado provided for its erection as a state university. It now comprises the following departments: the college of liberal arts, the graduate school, the school of applied science, the medical school and the school of law. The faculty numbers over 200, the students number 1200 and the library contains 64,000 volumes.

Colorado Beetle. See POTATO BUG.

Colorado River or Rio Colorado is formed by the junction of the Green and Grand rivers in Utah. It flows southwest and south through Utah into Arizona, forming the boundary between Arizona on one side and Nevada and California on the other. After a course of about two thousand miles from the source of the Green River it empties into the Gulf of California. The basin of this river shows a most wonderful example of the erosive power of water. In its course the river receives many tributaries in deep canyons and valleys, and many of the minor tributaries are incised in deep canyons like the main stream. Among the most wonderful natural objects in the world is the Grand Canyon of the Colorado in Arizona, through which the Colorado River runs for over 250 miles. This canyon is from 5 to 6 miles wide at the top and from 5000 to 6000 feet deep. The descent is gradual until the canyon proper, in the middle of the depression, is reached. Here the walls fall suddenly from 2000 to 3000 feet, and at the bottom of this narrow gorge runs the river.

Colorado River, a river of Texas, rising in the northwest part of the state. It flows in a southeasterly direction through the state and empties into the Gulf of Mexico, through Matagorda Bay. The chief towns on its banks are Bay City, Austin, La Grange and Bastrop. It is 650 miles long and is navigable up to Austin, a distance of 200 miles.

Colorado Springs, COL., the county-seat of El Paso co., 73 mi. s. of Denver, on the Atchison, Topeka & Santa Fé, the Denver & Rio Grande and other railroads. The city is located on a plain about six thousand feet above the sea, near the base of Pike's Peak, and the healthful climate has made this section a popular resort for tuberculosis patients. Colorado College and the state institutes for the blind and the mute are located here. The place was settled in 1870 and was incorporated two years later. Population in 1910, 29,078.

Color Blindness, a defect of the eye, which prevents the recognition of certain colors. The most common forms are known as *green blindness*, in which the affected eye fails to recognize green, that color usually appearing as yellow; and *red blindness*, in which the eye cannot recognize red but sees it as a bright yellow or a pale yellow. Some eyes are so defective that they fail to recognize three colors, while occasionally one is found who can recognize only black and white. Color blindness is caused by an insufficient amount of light or by a defective retina. The first cause is common to all eyes, as objects seen in the night seldom show colors, except different shades of black and white, while nearly all objects seen by moonlight have a bluish tint. The second cause is limited to individuals whose eyes are defective in this respect. The continual straining of the eye in observing objects at long distances sometimes produces color blindness of the objects continually looked for, as in the case of trainmen on railways who have followed the road for a long time. These men frequently become color blind to red and green.

Color Printing. See PRINTING, subhead *Color Printing*.

Col'osse'um, a name given to the Flavian Amphitheater in Rome, a large edifice for gladiatorial combats, fights of wild beasts and similar sports. It was begun by Vespasian and finished by Titus, 80 A. D. The outline of the Colosseum is elliptic, the exterior length of the building being 620 feet, its breadth, 513 feet, and its height, 157 feet. It is said to have seated 87,000 people and to have had standing

room for 20,000 more. The arena, or central space, measured 280 by 176 feet and was enclosed by a low wall, a protection against the wild beasts. The flooring was of boards covered with red sand (*arena*) to soak up and conceal the blood. Underneath were rooms for housing men and animals. The exterior of the building



THE COLOSSEUM

was decorated by three rows of columns, the first story with Doric, the next with Ionic and the third with Corinthian columns. Down to the sixth century this imposing building remained almost uninjured, but at that time Theodoric, king of the Goths, had material taken from it for the construction of various buildings. The ruins to-day show four stories on one side only. The name is derived from the colossal statue of Nero, which stands close by.

Colos'sus, in sculpture, the name for a statue of very large size. The Egyptians have furnished us with many excellent examples of colossal statuary, among which the most celebrated are those of Amenophis III, one of which was the so-called *Memnon*, whose vocal powers were fabled as one of the wonders of ancient times. The Greeks produced the most artistic colossi, among which were the bronze statue of Pallas Athene, on the Acropolis of Athens; the statue of Athene of gold and ivory, in the Parthenon at Athens, and the Olympian Zeus, sculptured by Phidias. One of the seven wonders of the world was the *Colossus of Rhodes*, representing Helios, the sun god. It stood astride the entrance of the harbor of Rhodes, a bronze figure probably ninety feet high. The Romans followed the Greeks in this form of art and produced such colossi as the statue of Jupiter, on the Capitol; and that of Nero, 110 feet high, from which the near-by amphitheater derived its name of *Colosseum*. Among modern works of this nature are the *Germania* at Niederwald, on the Rhine; *Bavaria*, at Munich; the statue of Peter the Great, at Saint Petersburg, and the

statue of *Liberty Enlightening the World*, New York (See LIBERTY, STATUE OF).

Colt, SAMUEL (1814-1862), an American machinist and the inventor of the revolver, born in Hartford, Conn. He began his career as a lecturer on chemistry and traveled over a portion of the United States and Canada while engaged in this work. In 1835 he secured the patent for a revolving pistol, but it was a number of years before the value of his invention was realized. The Mexican War created a demand for the revolver, and in 1852 Colt built a large factory in Hartford, where he manufactured not only revolvers but other firearms for English and Russian arsenals. He was also noted as the inventor of a submarine battery for harbor defense.

Columbia, S. C., the capital of the state and the county-seat of Richland co., 82 mi. n. e. of Augusta, Ga., 153 mi. n. of Savannah and 130 mi. n. w. of Charleston on the Seaboard Air Line, the Southern and other railroads and on the Congaree River. The city is in a cotton region, near extensive forests, and a canal from the river furnishes water power. The manufacturing of cotton products is the chief industry, and there are also machine shops, foundries and wood-working plants. The courthouse, the city hall, the statehouse, the Y. M. C. A. building and several office buildings are noteworthy. Columbia is the seat of the University of South Carolina, the Presbyterian Theological Seminary and other denominational institutions. It was settled about 1700 and remained small until the capital was moved here from Charleston in 1786. During the Civil War Sherman entered the city, February 17, 1865, and the following night three-fifths of the place was destroyed by fire. The city recovered rapidly after the war, and its recent development is a part of the general revival in the South. The commission form of government was adopted in 1910. Population, according to the federal census of 1910, 26,319; the annexation of a number of suburbs raised the total to 56,992 in 1913.

Columbia, Mo., the county-seat of Boone co., 144 mi. w. of Saint Louis, on the Wabash railroad and on a branch of the Missouri, Kansas & Texas system. The city is situated in a farming, fruit-growing and stock-raising district and has extensive flour and planing mills and manufactures of agricultural implements. The state university and the state agricultural college are located here. Columbia contains a monument to Thomas Jefferson, a state hospital and an

agricultural experiment station. The place was settled in 1821. Population in 1910, 9662.

Columbia, PA., a borough in Lancaster co., 28 mi. s. e. of Harrisburg, on the Pennsylvania and the Philadelphia & Reading railroads and on the Susquehanna River. It is an important industrial center and manufactures engines, boilers, machinery and wagons; it also has oil refineries and distilleries. Columbia was settled in 1726 by the Quakers and was known for many years as Wright's Ferry. It is connected with Wrightsville on the west bank of the river by one of the longest bridges in the United States. Population in 1910, 11,454.

Columbia, TENN., the county-seat of Maury co., 45 mi. s. of Nashville, on the Duck River and the Louisville & Nashville and the Nashville, Chattanooga & Nashville railroads. It is located in a fertile agricultural region and has an extensive trade in grain and live stock. Among the industrial establishments are cotton and flouring mills. Columbia Institute, for girls, and Columbia Military Academy are located here. Columbia was settled in 1811 and was incorporated in 1822. Population in 1910, 5754.

Columbia, DISTRICT OF. See DISTRICT OF COLUMBIA.

Columbian Exposition. See WORLD'S COLUMBIAN EXPOSITION.

Columbia River or Oregon River, a river rising in the Rocky Mountains in British Columbia, flowing in winding course, chiefly through the United States, into the Pacific Ocean. Near its mouth it forms the boundary between Washington and Oregon. The salmon fisheries of this river are famous. The river is also noted for its beautiful scenery. Its chief tributaries are Clarke's Fork, the Spokane River and the Snake River. It is about 1400 miles long and drains an area of 300,000 square miles.

Columbia University, one of the oldest educational institutions in the United States, situated in the city of New York; chartered in 1754 by George II, under the name of King's College. The first president was Dr. Samuel Johnson of Connecticut. In 1784 its name was changed to Columbia College; and in 1896 the name Columbia University was adopted to designate the institution as a whole, and the name Columbia College was restricted to the undergraduate department. The institution at present comprises the following schools and colleges: (1) Columbia College; (2) Barnard College, an undergraduate school for women; (3) Teachers' College; (4) the school of law;

Columbine

(5) the College of Physicians and Surgeons, with which are connected Vanderbilt Clinic and Sloane Maternity Hospital; (6) the schools of political science, philosophy and pure science; (7) the school of applied science, which is composed of the schools of chemistry, mining and engineering; (8) courses in the fine arts; (9) the summer school. The number of instructors is over 700, and of students about 9500; the library contains about 450,000 bound volumes.

Col'umbine, the popular name of plants with five colored sepals and five spurred petals. The common columbine is a favorite garden



WILD COLUMBINE

flower and owes its name to the fancied resemblance of the petals to the form of pigeons. In the United States several species grow wild and are known commonly, but erroneously, as honeysuckles.

Colum'bus, GA., the capital of Muscogee co., on the left bank of the Chattahoochee River, 100 mi. s. of Atlanta. It is on the Georgia Central, the Southern and the Georgia and Alabama railroads. The principal industries are large cotton mills, iron works, plow, barrel and bagging factories. The export trade in cotton is extensive. Population in 1910, 20,554.

Columbus, IND., the county-seat of Bartholomew co., 41 mi. s. by e. of Indianapolis, on the e. fork of the White River, and on the

Columbus

Pennsylvania, and the Cleveland, Cincinnati, Chicago & St. Louis Railroads. It manufactures pulleys, tools, starch, flour, furniture, tanned leather and threshing and saw-mill machinery. Population in 1910, 8813.

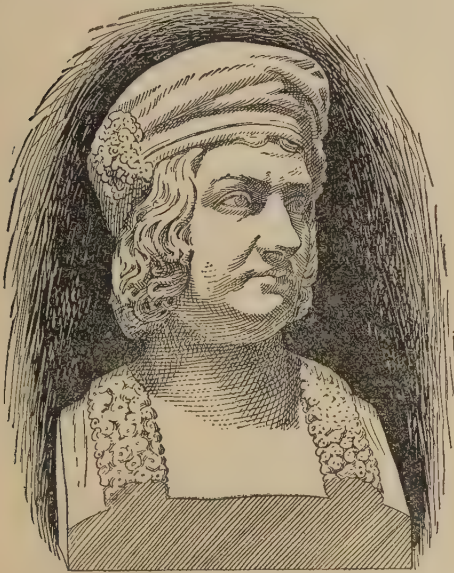
Columbus, Miss., a city of Lowndes co., on the Tombigbee River and on the Southern and the Mobile & Ohio railroads. The industries include cotton mills, flouring mills, iron foundry, manufacture of agricultural implements and many small factories. Large quantities of coal are found in the vicinity. It is the seat of the Mississippi Industrial Institute and College, one of the largest girls' schools in the country. Population in 1910, 8988.

Columbus, OHIO, the capital of the state and the county-seat of Franklin co., situated on the Scioto River, 120 mi. n. e. of Cincinnati, and on the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis, the Pennsylvania and other railroads. Among the public buildings the most important is the state capitol, a large stone structure. The present large state buildings are in the Doric style, covering nearly three acres and costing \$2,500,000. There are various charitable and educational institutions, among them being the Ohio State University, the Capital University, Ohio Medical University, Ohio Agricultural and Mechanical College, five public hospitals, including a hospital for the insane, a deaf and dumb asylum, a blind institute and a state library. Columbus is the site of the state penitentiary. The city has a large inland trade in grain, wool, live stock, and has, also, important manufactures, principally iron and steel products, agricultural implements and carriages. In the neighborhood are extensive coal and iron fields. Columbus was chartered as city in 1834. Population in 1910, 118,511.

Columbus, CHRISTOPHER (1446-1506), the discoverer of America, born in or near Genoa, Italy. He was carefully educated and early in life he developed a taste for adventure and a desire for geographical knowledge. About 1470 he came into possession of maps and papers which confirmed his opinion that the continent of Asia could be reached by sailing westward. Already he had become acquainted with the principles of navigation and had had considerable experience as a seaman, on voyages to England, the Canaries, Guinea and perhaps Iceland. For years he worked unceasingly to gain financial support for his enterprise. He first went to wealthy individuals in Genoa,

Columbus

Venice and Lisbon, and then unsuccessfully implored the aid of King John of Portugal. He finally went to Spain, and for five years followed the court from place to place, pleading his cause at every opportunity. When almost disheartened by his many reverses, he stopped at a convent, La Rabida, where he



CHRISTOPHER COLUMBUS
From a bust by an unknown sculptor, Capitoline
Museum, Rome

accidentally met a well-known mariner, whose interest was at once aroused. A messenger was dispatched to the Spanish court, then encamped before Granada. The mission was successful, owing, probably, to the brilliant termination of the war against the Moors, which ended in the fall of their great stronghold, Granada. By the aid of Isabella, queen of Spain, he was enabled to start on a voyage to prove his theories, and on October 12, 1492, he landed on one of the Bahama Islands and named it San Salvador. He reached Cuba October 28, and Hayti December 6. Establishing a colony, called La Navidad, there, he returned to Spain. He made a second and a third voyage, discovering a number of islands and the mainland of South America. But, meantime, his settlement had been destroyed or deserted, and he built a new town, Isabella. He showed surprising incapacity as an administrator, and was superseded and sent in chains to Spain. He was released, however, and undertook a fourth voyage, May 9, 1502. He encountered terrible storms, suffered

Column

shipwreck and returned to Spain, sick and exhausted, in 1504. After two years of illness and despondency, he died at Valladolid.

Column, *kol'um*, in architecture, a pillar, generally cylindrical in form, made of wood, stone, iron or other material and used to support a weight or to serve as an ornament. Strictly speaking, a column consists of a *base*, on which it rests; a *shaft*, cylindrical in form, and a *capital*, the portion surmounting the shaft. The Egyptians very early began to use columns extensively, as may be seen in the ruins of their temples. A great variety of designs and forms were employed, some columns being plain, smooth cylinders, elaborately decorated; others, square or polygonal in shape, and others, resembling a bundle of palms or lotus stems bound together. All were massive and heavy in appearance. The Persian columns were generally tall and slender.

The Greeks developed the forms of columns to their highest perfection, and their designs became conventionalized into the so-called *three orders of architecture*, in which the styles of the base, shaft and capital conform to certain fixed rules.

The *Doric* order (Fig. 1) is the oldest and simplest, and it is most frequently seen among the remains of ancient Greek architecture. It is distinguished by its want of a base and by its plain capital. The shaft is about five diameters high and is fluted, the flutes being few in number and joined together. The capital has two parts, of equal thickness, the upper a square block or plinth, called the *abacus*, resting upon a circular tablet, or *echinus*. The *entablature* is the portion above the capital and consists of three parts, the *architrave*, or portion directly above the column; the middle, or *frieze*, which is the only part decorated in the Doric order, and the *cornice*, or upper part. The best example of the Doric order of architecture is the Parthenon at Athens.

The *Ionic* order (Fig. 2) was invented by the Asiatic Greeks and was far more graceful and decorative than the Doric, though not elaborate. It is light and slender, the shaft being about eight times its diameter in length. The capital is higher than the Doric, is ornamented and connected with the architrave by a thin ornamented abacus. The shaft is fluted and the twenty-four flutes are separated by narrow flat surfaces. The Erechtheum, on the Acropolis at Athens, is a good example of the Ionic style.

The *Corinthian* order (Fig. 3), though invented by the Greeks, hardly attained the dignity of an order till Roman times. It is really an Ionic

column with a more elaborate capital, adorned with beautifully carved acanthus leaves. The Choragic Monument of Lysicrates at Athens contains fine examples of Corinthian columns.

The Romans borrowed their styles of columns from the Greeks and added the *Tuscan* and the *Composite* orders, besides perfecting the Corinthian base and entablature. The *Tuscan* was a development of the Doric, being perfectly plain, with an unchanged base and pedestal, and was invented by the Etruscans and other early Italian races. The *Composite*, also called the *Roman* or *Italic* order, combined the Ionic and Corinthian orders and was especially pleasing to the Romans on account of its rich ornamentation. The use of the arch among the Romans compelled the building of heavy piers

any building, have been erected at all times as monuments to commemorate important names and events, though they had at first only a religious significance. The Romans especially excelled in these monuments, the chief of which are the Column of Trajan and the Column of Antonine. See JULY, COLUMN OF; TRAJAN'S COLUMN.

Comanche, *ko man'che*, an Indian tribe which formerly roamed through Texas and parts of Mexico. They were excellent horsemen and extremely warlike, but their numbers are now insignificant. About 1500 of them have been collected on a reservation in the western part of what was formerly Indian Territory.

Combustion or **Burn'ing**, in the ordinary sense of the word, is the union of some substance

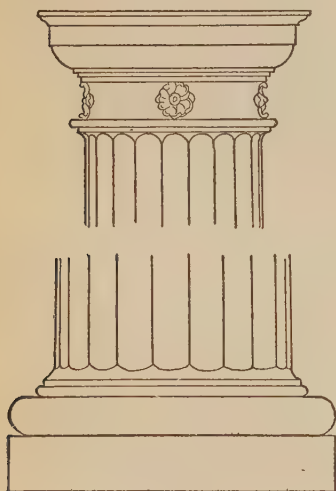


FIG. 1

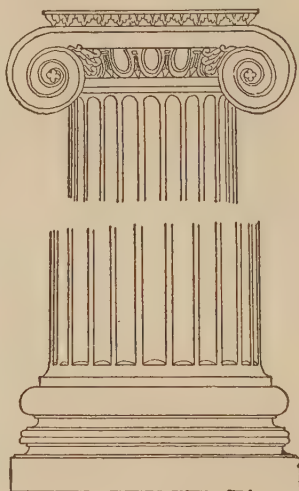


FIG. 2



FIG. 3

to support the structure, as slender columns would have been too fragile, and thus the column came to be used merely for decorative purposes. Columns were often embedded in the masonry between the arches or attached to the faces of the piers and ornamented with beautiful designs.

Early Christian and medieval European architecture made free use of the column and introduced varied forms, especially in the shafts, which were often spiral, twisted or knotted, and were employed more often in groups or clusters than singly, chiefly as supports for arches. They were a feature of interior architecture, rather than exterior, as was the case with the Greeks. In modern architecture the column plays a subordinate part, both in decoration and usefulness.

Columns standing alone, unconnected with

with oxygen, the union producing light and heat; for example, when wood or paper burns there is a bright flame and considerable heat. The term may be used, however, to mean the chemical union of any two substances, so as to give heat and light. Thus, chlorine burns in an atmosphere of hydrogen. The amount of heat given out by burning substances depends on their chemical composition and on the way the elements are combined. Heat may be produced rapidly, as when phosphorus is burned in the air and a flame results, or it may be formed slowly, as when phosphorus slowly combines with oxygen and is said to oxidize slowly. The amount of heat produced in each case is the same, and both are said to be in a state of combustion. The temperature of a burning substance is different from the amount of heat produced. In

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the case of brightly burning phosphorus, the temperature, measured by a thermometer, is high; but in the case of slowly oxidizing phosphorus, the temperature is low.

The products of combustion in most cases are gases and some solid matter. In early times it was thought that when a substance burned it was destroyed; but when chemists were able to collect the gases that came off from a burning body and analyzed them, it was found that such was not the case. Nothing is destroyed. The form is merely changed.

Com'edy, a form of drama in which the subject matter is less serious and the treatment less dignified than in tragedy, and in which the outcome is happy. It is in general less exaggerated in its humor than the farce or the burlesque. The following list includes some of the best-known comedies in modern literature:

L'Avare (1668).....Molière
Minna von Barnhelm (1767).....Lessing
She Stoops to Conquer (1773).....Goldsmith
The Rivals (1775).....Sheridan
The School for Scandal (1777).....Sheridan
Comedy of Errors (1594).....Shakespeare
Merchant of Venice (1597).....Shakespeare
Much Ado About Nothing (1597).....Shakespeare
As You Like It (1599).....Shakespeare
Twelfth Night (1602).....Shakespeare
Rip Van Winkle (1866), Jefferson and Boucicault.

See DRAMA.

Comenius, JOHN AMOS (1592-1671), a Moravian clergyman and educator, born at Komna, Moravia, and educated at the University of Heidelberg. He began his career as a teacher in the school of the Bohemian Brethren in Moravia. He afterwards became a preacher and assumed charge of a school in his parish. After the Thirty Years' War he settled in Poland and assumed the direction of a gymnasium. It was while holding this position that he published his first great work, *The Gate of Tongues Unlocked*. This work completely revolutionized the methods of teaching language and met with extraordinary success. Within a few years it was translated into nearly all the languages of Europe and several of those of Asia. The year following the appearance of the work, Comenius was elected bishop of the Moravian Brethren and he spent the next few years in the preparation of a still greater pedagogical work, which set forth in several volumes logical and natural methods for teaching all branches of knowledge. The influence of this work was such that Come-

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nus received invitations from the governments of England and Sweden to reform the school systems of those countries. He was unable to accomplish anything in England, because of political conditions, but he greatly improved the school system of Sweden. He then published his third work, *The World Illustrated*. This was the first illustrated text-book ever issued, and it created nearly as great an interest as the work on teaching languages. In some form or other this book has been handed down to the present time.

Comenius was the greatest educator of his time and can justly be considered the originator of methods and principles in general use at the present day. He divided schools into four classes: the mother school, which was the home; the vernacular school, or the primary school; the Latin school, and the university. He believed in the study of the mother tongue, the various branches of natural science and natural history. He also advocated the development of the child's moral and spiritual nature along with his intellectual powers, and he believed in physical training and an equal education for both sexes. Consult Quick's *Essays on Educational Reformers*.

Com'ets, bodies moving with incredible speed from or toward the sun, in remarkable orbits. To the naked eye the comet appears to be composed of three parts: a star or bright spot, called the *nucleus*; a foggy mass surrounding this, called the *coma*, and the field of light, or *tail*, which follows the main comet. The tail is usually bright and narrow near the head, but it widens into a fan-shaped appendage farther from it. While the comet is approaching the sun, the tail trails behind, but as the comet goes away from the sun, the tail precedes it. The three parts are not always present, however, for sometimes a comet may seem like a thin cloud with a bright spot near the middle, or even like a small hairy mass. Comets vary greatly in brilliancy, some being exceedingly bright, but not many of them are visible to the naked eye, only about thirty of such appearing in a century. By means of the telescope new ones are continually being discovered. Some of these bodies travel around the sun in elliptical orbits; others appear from some unknown source, go toward the sun, pass around it and then depart on a line nearly parallel with the one on which they approached; while a third class, after going beyond the sun, leave it on a line which diverges from the one of their approach. It is evident that comets

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traveling in either of the last two orbits will never again approach the sun unless they are attracted from their respective courses. No astronomer knows with certainty the exact composition of a comet or its origin; it is hard to tell what force has sent some of them from some other system, apparently, into this one of ours for a time; but the astronomers can predict the return of comets which have once appeared, if they are of the type that do return.

It is supposed that the nucleus is composed of hard matter, perhaps meteoric stones, and that the tail is gaseous, not necessarily itself in combustion, but perhaps bearing only reflected light of the sun. One comet at least has been known to divide into two and then to disappear, and it is thought that others are fading away. Of the comets that have been seen thus far, *Halley's comet*, which was discovered in 1682 and remained in sight for about a month, is the most important. Records show that it appeared in 1607, 1531 and 1456. It appeared again in 1759, 1835 and 1910. Upon observations of this comet much of the modern theory is based. Other comets of importance are *Lexell's comet*, which was seen in 1770, but never reappeared; *Biela's comet* (1772, 1805, 1826, 1845), which later broke into two parts and then disappeared; and *Encke's comet* (1786). The last returns at irregular intervals of about three years. The most remarkable and brilliant of all was *Donati's comet*, which appeared in 1858. This will probably return in about the thirty-eighth century. In 1843 a very remarkable comet appeared, passing so near the sun that it probably went through the outer vapor of that body. In 1880 a similar comet appeared, apparently in the same orbit, and again in 1882, a third, to all appearances exactly similar to the two preceding. These are the first cases on record where several comets have been found in the same orbit, following one another in close succession.

So wonderful a phenomenon as the appearance of one of the brilliant comets in the sky has always been accompanied by superstitious dread among ignorant people, and before science had accounted for the appearance of these curious heavenly bodies, they occasioned the greatest terror; they were thought to indicate the rapid approach of the end of the earth. Even yet speculation as to what would happen should the earth meet a comet is rife. It is not impossible that such a collision might take place, and it is possible, too, that meteoric showers are in some

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way associated with the near approach of a comet.

Comitia, *ko mish'i ah*, the name given in ancient Rome to the meetings of the people in which state questions were voted upon. The *Comitia Curiata* was the oldest of the comitia and was made up of patricians only. For centuries, until the time when the plebeians grew strong in their demands for equal rights, the *Comitia Curiata* had the highest power in the state. Its importance grew less, however, as the *Comitia Centuriata* became more prominent. This second assembly admitted the entire free population of Rome, and the vote was taken by units containing one hundred or more persons, and called centuries. The third assembly, the *Comitia Tributa*, was an assembly of the tribes and was probably made up entirely of plebeians, although this is not certain.

Commencement, *kom mens'ment*, in colleges and universities of the United States, the day upon which the degrees of bachelors of arts, masters of arts and honorary degrees are conferred upon students and scholars. It is commonly used to designate the exercises marking the close of secondary and elementary schools, but this use of the term is hardly justified.

Commerce, *kom'murs*, the exchange of products, and specifically, an exchange transacted between people remote from each other. The first means of commerce was barter, the different producers meeting in person and exchanging their goods. With the development of civilization and industry, exchanges became so common and complex that some men devoted themselves entirely to conducting exchanges. Thus arose the class known as merchants. During the Middle Ages these merchants began to congregate at certain times and places for the more economical exchange of their wares; so markets and fairs came into vogue. Eventually, these market places grew in importance and size until whole towns were given over to this trade and were licensed by the king. With the decline of feudalism, however, and the gradual growth in the independence of individuals, commerce became more general and the old market towns lost their prestige, though fairs and markets are still held in some isolated parts of Europe. Commerce between Europe and Asia was stimulated by the Crusades, but not until the sixteenth century did trade between nations begin to assume its present world-wide importance.

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The impetus which it received at that time was due to the invention of the compass and advancement in the science and art of navigation, which led to more extended voyages on the open seas and to the spirit of exploration, which, during the fifteenth and sixteenth centuries, resulted in the discovery of new fields of riches. The establishment of colonies in the New World led to an interchange of products between them and the mother countries. Each European nation carefully guarded and restricted the commerce between itself and its colonies, but often with more zeal than wisdom, for anxiety to derive revenue from colonial possessions led to a policy of repression which often retarded the development of the colonies. Previous to the Revolutionary War, the commerce of the American colonies of England was restricted by navigation acts, which eventually became the cause of serious disagreement and finally of separation of the colonies from the mother country.

The commerce of the United States as a nation dates from 1790; during the first decade the imports amounted to \$91,252,768, and the exports to \$70,971,780. For a few decades, owing to international complications and domestic disturbances, commerce did not increase, but after 1830 it developed rapidly, and its growth has continued steadily ever since, as shown by the following table:

FISCAL YEAR	IMPORTS	EXPORTS
1845	\$ 113,184,322	\$ 106,040,111
1850	173,509,526	144,375,726
1860	353,616,119	333,576,057
1870	435,958,408	392,771,768
1880	667,954,746	835,638,658
1890	789,310,409	857,828,684
1900	849,941,184	1,394,483,082
1901	823,172,165	1,487,764,991
1902	903,320,948	1,381,719,401
1903	1,025,719,237	1,420,141,679
1904	991,087,371	1,460,827,271
1905	1,117,512,629	1,518,561,720
1910	1,557,906,671	1,710,000,000

The internal commerce of the country greatly exceeds its foreign commerce and is larger than that of any other country in the world. This is due to its wide extent of territory, its extensive railway systems (See RAILROADS), its unequalled facilities for transportation by lakes and navigable rivers, the inventive genius of the American people and their general prosperity.

The nineteenth century, especially its last quarter, was remarkable for commercial development throughout the world, and the progress then shown has continued in the opening years of the twentieth century. In the following table

Commercial Education

the commercial progress of the leading countries of the world is shown, the sums representing millions of dollars:

COUNTRY	IMPORTS		EXPORTS	
	1870	1910	1870	1910
Austria-Hungary	210	570	192	483
Belgium	184	852	138	680
Canada	74	391	73	301
China	45	308	47	253
France	553	1434	541	1246
Germany	775	2233	551	1868
Great Britain	1259	2872	971	2150
India	170	575	255	720
Italy	192	641	200	401
Japan	35	232	15	229
Netherlands	187	1292	153	1046
Russia	201	477	216	692
Spain	101	200	77	193

Commerce, CHAMBER OF, a board chosen from among the merchants and traders of a city to protect the interests of commerce; to lay before the legislature the views of their members on matters affecting commerce; to furnish statistics as to the trade of the locality, and to attain by combination advantages which could not be reached by individual enterprise. A system of international chambers of commerce, for promoting relations with foreign countries, has been largely adopted. Nearly every city has a chamber of commerce, which is usually the most important factor in its commercial life.

Commerce, DEPARTMENT OF, a department of the United States government, established by an act of Congress, February 11, 1903, as the department of commerce and labor, but since March 4, 1913, a separate department. The department embraces a number of bureaus that formerly belonged to other departments, such as the lighthouse board, the lighthouse establishment, the steamboat inspection service, the coast and geodetic survey, the bureau of statistics, the bureau of navigation, the census bureau, the bureau of foreign commerce, the bureau of standards, and the fish commission. It also includes two new bureaus, those of corporations and manufactures. It is thought that the former will be one of the most important branches of the department. The duties of this bureau will be to deal with the corporations, other than railroads, engaged in commerce with foreign nations and between states. The commissioner has the same authority to investigate such corporations and secure evidence as is given the Interstate Commerce Commission over railroads. See UNITED STATES, subhead *Government*.

Commercial Education. See BUSINESS COLLEGE.

Commercial Law, the law which regulates commercial affairs. It is derived from the maritime codes of medieval Europe, the imperial code of Rome, international law and the customs of merchants. In the United States the term includes chiefly the law dealing with contracts. The principal subjects embraced within it are the laws of shipping, negotiable bills of exchange, promissory notes and sales. See **BILL OF EXCHANGE**; **NOTE**; **MORTGAGE**.

Commission System. See **MUNICIPAL GOVERNMENT**.

Committee of Public Safety, a body elected by the French Convention, April 6, 1793, from among its own members. At first it had very limited power conferred upon it—that of supervising the executive and of accelerating its actions. Subsequently, however, its powers became extended; all the executive authority passed into its hands. See **FRENCH REVOLUTION**.

Common Council, the legislative body of a city or incorporated town. The common council sometimes consists of two houses, chambers or courts, and sometimes forms only one. In American cities the city council is elected by the people, and in some instances it appoints the mayor.

Common Law, the unwritten law, the law that receives its binding force from immemorial usage and universal reception. It consists of that body of rules, principles and customs which has been received from former times, and by which courts have been guided in their judicial decisions. It is contrasted with (1) the *statute law*, contained in acts of a legislature; (2) *equity*, which is also an accretion of judicial decisions, but is formed by a new tribunal, which first appeared when the common law had reached its full growth; (3) the *civil law*, inherited by modern Europe from the Roman Empire. Wherever statute law runs counter to common law the latter is entirely overruled; but common law asserts its preëminence where equity is opposed to it. In the United States there is no national common law, but state courts have relied on the English common law and have developed a fairly uniform system of common law throughout the country. See **LAW**; **CIVIL LAW**; **EQUITY**; **STATUTE**.

Commons, **HOUSE OF**. See **GREAT BRITAIN**, subhead *Government*.

Common Schools, schools giving instruction in elementary branches. In the United States common schools mean public schools below the high school.

EARLY HISTORY. In the ancient oriental nations, all systems of education were either military or religious, and education was confined to the ruling classes, whose power depended upon the ignorance of the great mass of people. Sparta gave a military education to all boys, and Athens added intellectual training to military training. Here education was the affair of both the family and the State. In Rome, education was the especial care of the mother, or matron, during the period of Roman ascendancy; later, it was turned over to nurses and teachers. During the Middle Ages, education was almost entirely under the control of the Church, till some of the great rulers, such as Alfred the Great and Charlemagne, took a wide interest in education and extended the educational influence of their empire. But education was not general, and all teachers came from the ranks of the clergy.

THE REFORMATION. The Reformation and the invention of printing with movable types are responsible for the establishment of public schools throughout Europe. Luther not only favored public schools, but his doctrine made them a necessity to his followers. He held that individuals were responsible for their beliefs, and that these beliefs were to be based on the personal study of the Bible; hence, it was necessary for every one to learn to read. Previous to Luther's time, Latin had been generally taught in the schools, and little or no attention had been given to the teaching of the mother tongue. Now children were taught to read and write their own language. The invention of printing, which occurred a few years before, made it possible to supply the people with books and thus aided in the work of general education. See **LUTHER**, **MARTIN**; **REFORMATION**.

Common schools were established in Prussia, France, Holland and Scotland. The Thirty Years' War in Prussia proved disastrous to the progress of education, and it was not until after the close of that struggle that the common schools were firmly organized. In France elementary schools were established among the Huguenots, but with the revocation of the Edict of Nantes and the consequent emigration of large numbers of these people and an accompanying decline in revenues, government aid to public education became practically impossible (See **HUGUENOTS**; **NANTES**, **EDICT OF**). Public schools under state aid were not founded until 1833. Common schools existed in Scotland even before the Reformation, and from their first estab-

lishment to the present time that country has given them the necessary support. The common schools of England are called *board schools*, being established under an act of parliament, passed in 1870, which provided that in every school district public elementary schools should be maintained for the accommodation of all the children resident in the district. These schools are called board schools because the act creating them provides for the election of school boards by the taxpayers to carry out the provisions of the act, which compels the attendance of children between the ages of five and thirteen. The so-called public schools, of which Eton and Rugby are good examples, are great preparatory schools for boys of the wealthier classes. The early elementary schools in that country were generally known as *dame schools*, because they were taught by women. See EDUCATION, NATIONAL SYSTEMS OF.

UNITED STATES. The American colonists gave early attention to education. Schools were established in Boston as early as 1635, and in 1637 the General Court of Massachusetts decreed that every town having fifty families should establish a common school for the instruction of the children who desired to attend. The expenses of such schools were to be met either by the town as a whole or by the families whose children attended. The same act provided for the establishment of a grammar school, which should fit boys for college, in every town of 100 or more families. Connecticut and New Haven followed within the next few years, but no system of public schools was established in Rhode Island until 1790. Among the Middle Colonies, the Dutch in New York organized a system of public schools before that colony was taken by the English. After this event little attention was paid to public education until after the Revolution. The Swedes in New Jersey and Delaware also founded schools, and the charter granted William Penn provided for a system of public education. This, however, was not carried out until long after Penn's death. In 1698 the Society of Friends established a school in Philadelphia, which is now known as the Penn Charter School, but it was not until after the middle of the eighteenth century that measures were taken for systematic instruction of the children by the colony.

The Southern colonies, having an entirely different social system, did not establish public schools. The large plantations and the consequently sparse settlement of the country made

such institutions practically impossible during the early history of these colonies. The children of planters were taught in their homes, either by tutors or governesses, and the boys of some wealthy families were sent to England to complete their education. The growth of slavery, following the Revolutionary War, perpetuated the early institutions of the South, so that few free public schools were established in the slaveholding states until their reorganization after the Civil War.

The resources of the country were so thoroughly taxed during the Revolutionary War that but little attention could be given to education; consequently there was no progress in the common schools during that period. After the close of the war the New England states gave attention to their schools. With the exception of Massachusetts, in New England and all other parts of the country, free public schools were considered charitable institutions, maintained for the education of the children of those families who were too poor to pay for the instruction; and wherever possible rate bills or local taxes were assessed on all families sending children to these schools. This plan made the schools odious to those for whom they were established, and contemptible to others; consequently it did not succeed.

The establishment of public schools at state expense was undoubtedly delayed because of the lack of funds, and the condition of the country was such during the years immediately following the Revolution that increased taxation for any purpose was impossible. In 1805 the Public School Society of New York was formed. The purpose was to maintain schools for the instruction of those children whose parents were unable to provide it themselves, but the plan was soon broadened to include all children who applied, and from this the ascent to the support of common schools by the state was comparatively easy. Soon after this New York provided for county supervision of schools. Pennsylvania was somewhat behind New York, but the New England states were in the van of the movement. As the states west of the Alleghenies were organized, school systems, modeled after the plan of the states from which the settlers had come, were instituted.

The support of common schools has been obtained from various sources. The early schools were supported almost entirely by local taxation on the families receiving their benefit. From this the taxation of the township or village

was developed, and later the state tax, the appropriation of land rents and direct national aid were secured, but the most extended aid has been received from the congressional grants of public lands. The first of these was provided for in the Ordinance of 1787, which contained a provision that one section of land in every township in the states organized from the Northwest Territory should be devoted to the support of the common schools (See ORDINANCE OF 1787). By this means, all of the states embraced within the provisions of this ordinance obtained a large school fund. In 1848 the law was changed to provide two sections for each township, so that all states admitted since that date have twice the public land that those organized from the Northwest Territory received. In addition to this, Congress has made extensive grants of land which have been apportioned among the older states. These, all told, include over 80,000,000 acres, or 125,000 square miles, an area larger than Colorado, Maryland and New Hampshire combined. In addition to the funds derived from public lands, the government in 1836 distributed among the states about \$28,000,000 of surplus revenue, the amount received by each state being determined by the ratio of its population to the entire population of the country. A number of these states invested their share in a permanent school fund. The provision for state funds necessarily led to state control of these funds. In some states, like Illinois, the lands are leased, and the revenue thus derived is apportioned by the state department of public instruction according to provisions of the school law; in other states, like Minnesota, the land is sold, and the funds thus obtained are invested at a good rate of interest.

The control of the first public schools in the country was vested in the community in which the school was to be located. This was the origin of the so-called *district* system, which still has a strong hold upon many states. With the increase in population and the development of new states, there has been a tendency to administer the school system in larger units. In many of the New England states the township constitutes this unit, while in the Southern states, which have never been accustomed to township government, the county often constitutes the unit. The states in the Middle West, such as Illinois, Wisconsin, Iowa and Minnesota, adopted the plan of the older Eastern states from which their settlers came, and they still maintain the school district. But the county is the unit in

all these states for the purpose of supervision and for the examination and licensing of teachers. Large cities usually administer their school affairs under a special charter, which provides for a superintendent and a board of education. Each state has a department of public instruction, at the head of which is the superintendent. In some states this department has executive powers and is responsible for unifying the courses of study and determining the qualification for teachers, as in Minnesota; while in others the work of the department is almost wholly clerical and advisory.

The common schools of the United States are now, with few exceptions, thoroughly organized and economically managed. All cities, large towns and villages have graded schools, and in many states graded courses of study are provided for the rural schools. Immense sums have been spent upon buildings, grounds and appliances in cities and towns and in the wealthier rural communities. While each state is a law unto itself, as far as its determination of courses of study, qualifications of teachers, methods of organization and management are concerned, yet in their main features all of the state systems are essentially the same. Though there is not, technically or legally, a national system of education, the uniformity of these state systems practically makes the whole system national. The common schools of the United States enroll about 17,000,000 pupils, or one-fifth of the entire population, and they employ over 500,000 teachers. See EDUCATION, HISTORY OF, subhead *United States*; SECONDARY SCHOOLS; UNIVERSITY.

Commonwealth of England, the name usually given to the form of government which was in force from the death of Charles I, 1649, to the restoration of Charles II, in 1660. Correctly, however, the term should be applied only to the years between the abolition of the monarchy and the appointment of Cromwell to the protectorate. See CROMWELL, OLIVER.

Commune, *kommune*, the smallest government district in France and in some other countries, as Belgium. A commune sometimes embraces a number of villages, while some large cities are divided into a number of communes. In either case each commune is governed by an officer called a mayor, who is assisted by a deliberative assembly called the *conseil municipal*.

Commune of Paris, (1), a revolutionary committee which in 1792 took the place of the

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municipal government of Paris and soon usurped the supreme authority in the State. Among its chiefs were some of the most violent of the demagogues, such as Hébert, Danton and Robespierre. (2), The name adopted by the ultra-radical party in Paris brought into prominence by the events of the Franco-German War and, more immediately, by the siege of Paris (October, 1870, to January, 1871). This party ruled Paris for a brief period after the evacuation of the German troops and had to be suppressed by troops collected by the National Assembly of France.

Com'munism, the economic system or theory which upholds the absorption of all proprietary rights in a common interest, an equitable division of labor and the formation of a common fund for the supply of all the wants of the community. It is based on the denial of individual rights in property. No communistic society has as yet been successful, though many have been organized and some still exist. The most famous of those in the United States were those of Brook Farm, Mass. (See **BROOK FARM**), and New Harmony, Ind., the latter established by an Englishman, Robert Owen. Of those still in existence, the Oneida Community, in New York, and the Amana Community, near Davenport, Iowa, are of the most importance. Saint Simon, Fourier and Proudhon have been the chief exponents of the system in France. Communism differs from simple socialism, in including the socialization of *products*, as well as of the *means of production*, though some socialists do demand complete communism.

Com'muta'tor. See **DYNAMO-ELECTRIC MACHINE**.

Co'mo, capital of the province of Como, in the north of Italy, 24 mi. n. n. w. of Milan, in a delightful valley at the southwest extremity of Lake Como. It has a splendid marble cathedral, dating from the fourteenth century. The manufactures comprise woollens, silks and cotton. Here were born Pliny the Elder and the Younger, and Volta, the natural philosopher. Population in 1911, 44,146.

Como, a lake in the north of Italy, at the foot of the Alps, fed and drained by the river Adda. It is celebrated for the beautiful scenery of its shores, which are covered with handsome villas, gardens and vineyards, behind which mountains rise to the height of 7000 feet. Trout and other fish abound in the lake. The chief towns on its shores are Bellano, Bellagio and Menaggio.

Com'oro Islands, a volcanic group in the

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Indian Ocean, between the northern extremity of Madagascar and the continent of Africa, covering an area of 800 sq. mi. They are four in number: Great Comoro, Mohilla, Johanna and Mayotta. The soil is fertile and produces fruits, sugar cane, rice and cocoanuts. The entire group was ceded to France in 1886, but Mayotta has been a French colony since 1842. Population, estimated at 90,000.

Company, *kum'pa ny*, in commerce. See **PARTNERSHIP**; **JOINT STOCK COMPANIES**; **CORPORATION**; **TRADING COMPANIES**.

Compass, *kum'pas*, an instrument for determining direction with reference to the north and



SURVEYOR'S COMPASS

south points. The earth is a gigantic magnet, with its poles near the geographical north and south poles; and the attraction of these magnetic poles is sufficient to keep the needle pointing north and south. See **MAGNETISM**. Compasses are usually classified as the surveyor's compass, the mariner's compass and the variation compass. The *surveyor's compass* consists of a magnetic needle enclosed in a circular box and moving over a disk graduated to degrees, minutes and seconds. The frame has two vertical sights at opposite ends of a diameter, so as to secure accurate pointing. The direction of the line in which the compass points is determined by reading the number of degrees between the north pole of the needle and the line of sight. A level and a tripod are necessary parts of a surveyor's compass.

The *mariner's compass* is used on board ship; it consists of several magnetic needles arranged parallel to one another and attached to a card, which is mounted at its center upon the end of an upright steel pivot. The whole arrangement is enclosed in a circular brass box, which is hung within a wooden box and is so fixed that the compass card remains horizontal, whatever position the ship may take. The card is divided into thirty-two equal parts by lines drawn from the center to the circumference. The intervals between these points are divided into halves and

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quarters, so that the entire circumference is divided into 360 equal parts or degrees. Four principal points, north, south, east and west, are designated as *cardinal points*. The names of the others are compounds of these. The direction of the ship is determined by noting the number of degrees between the north pole of the needle and the course as indicated by a line from the center of the wheel to the point of the bow. Since the needle is subject to variation on account of the magnetism of the earth and also because of the influences of the ship itself, nearly all vessels carry several compasses, which are read and carefully compared several times each day. The variation is greater on steel vessels than on those constructed of wood. Navigators' tables, indicating the variation of the compass in various parts of the ocean, are in general use, and by these the navigator is able to correct his compass without difficulty.

The *variation compass* is so made as to show the changes that occur daily in the variations from the magnetic meridian. Its needle is much longer than that of the ordinary mariner's compass, so that minute variations are more easily read.

Compasses or Dividers, a mathematical instrument, used for describing circles and measuring lines. The compasses consist simply of two pointed legs, movable on a joint or pivot, and they are used for measuring and transferring distances. For describing circles the lower end of one of the legs is removed and its place is supplied by a holder for a pencil or pen. *Hair compasses* are compasses having a spring, tending to keep the legs apart, and a finely threaded screw, by which the spring can be compressed or relaxed with the utmost nicety and the distance of the legs regulated to a hair's breadth. *Bow compasses* are compasses having the two legs united by a bow passing through one of them, the distance between the legs being adjusted by means of a screw and nut. *Proportional compasses* are compasses used for reducing or enlarging drawings, having the legs crossing so as to present a pair on each side of a common pivot. By means of a slit in the legs and the movable pivot the relative distances between the points at the respective ends may be adjusted to the required proportion.

Compass Plant, an annual plant belonging to the family Compositae, common in the prairies of the Western states. The large ragged leaves grow upright on rather long stems. As

Compositae

the structure of these leaves is the same on both sides, both surfaces are equally sensitive to the light, and they are able to secure an equal amount of light for both sides of the leaves only by having their edges vertical and their tips to the north and the south. Resin weed is another name for this plant, derived from the fact that the stems contain resinous matter.

Com'plex Num'ber. See NUMBER.

Compositae, *kom poz'i tee*, the largest family of plants, containing over 12,000 known species, which are grouped in 1000 genera. They consist of herbs or shrubs and are distributed all over the world. The characteristic of the family is the head of small flowers, which in itself is sometimes mistaken for one large flower. The resemblance is made stronger by the fact that in many species the flowers in the outer margin of the head are different in form from the others,



COMPOSITAE

a, flower head; b, single ray flower; c, single disc flower; d, small head with tubular flowers only.

and their tubular corollas are modified so as to resemble the petals of a simpler flower. The small flowers in the middle of the head, which resemble the pistils and stamens of a typical flower, are intermingled with bristles and scales of various forms, that, with the appendages to the seeds, are important factors in classifying the plants of this difficult group. While a typical flower is on the plan of five and is perfect, yet the outer flowers are irregular and not infrequently imperfect and sterile. When it is remembered that nearly one-seventh of the known species of flowering plants belong to this one family, its importance may be understood. A great many of the plants are cultivated for ornament, and some few serve as food plants. Others have considerable medicinal value. A great many different plants of this order are described under appropriate titles in this work. See ARNICA; ASTER; CHRYSAN-

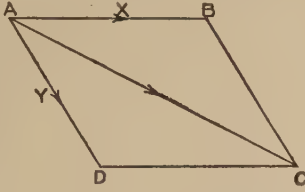
Composite Number

THEMUM; DAHLIA; DAISY; GOLDENROD; LETTUCE; TANSY; THISTLE, and many others.

Composite, *kom poz'it*, Number. See NUMBER.

Composite Order. See COLUMN.

Composition, *kom po zish'un*, of Forces, in mechanics, the union of several forces that are acting in different directions, into an equivalent force acting in another direction. Thus, two forces, as *X* and *Y*, acting in the directions of the adjacent sides of the parallelogram *ABCD*, unite to form a force acting in the direction of the diagonal *AC*. If the lengths of the adjacent sides of the parallelogram represent the relative magnitudes of the forces, the diagonal will represent the magnitude of the compounding force.



Compressed, *kom prest'*, Air, atmospheric air compressed by means of pumps (See AIR COMPRESSOR). As a means of transmitting power, compressed or condensed air received the attention of scientists as early as 1700 A. D. In that year, Dr. Papin, of Blois, the first man to apply a piston in a steam cylinder, the inventor of the digester and the steelyard safety valve, employed compressed air to drive a piston in a cylinder which was intended to drive a pump. He used a fall of water to compress the air, in a cylinder. His experiments were not successful. About one hundred years later, a Welsh engineer used the power derived from a heavy fall of water to work a blowing cylinder, from which the air was conveyed to a blast furnace, a mile and a half distant. The blast, however, was too feeble to do much work. About 1840, an English patent for the application of compressed air to working cranes, hoisting machines and other machinery was granted. The air was compressed by an air pump, or compressor, and was conducted through pipes to the machinery. The elastic air under pressure transmits the power used in compressing it, when it is permitted to expand in a suitable device which will respond to the pressure exerted.

AIR MOTORS. Another method of using compressed air has been developed by the improvements made in automobiles and motors for hauling street cars. The air, under enormous pressure, is stored in steel bottle-shaped reservoirs made seamless from a solid ingot of steel.

Compressed Air

These bottles are made to sustain a pressure of 3000 pounds or more to the square inch. When charged with the compressed air, they are coupled, singly or in series, with the auxiliary reservoir on the motors, and a suitable reducing valve permits the air to fill the auxiliary reservoir until the working pressure of from 10 to 100 pounds is secured. In practice, a small fire of coal, coke, gasoline or kerosene is maintained to heat the air, just before it is expanded into the working cylinder. The heat not only gives the compressed air added efficiency, due to the expansion caused by heat, but it also removes the objection due to the snow and ice formed by the suddenly released air. In compressing the air, heat is formed; in suddenly expanding the air, the heat is absorbed so rapidly that ice and snow are formed. This has been an objectionable feature in the use of compressed air for transmitting power. Compressed air is also used to operate rock drills, air motors in manufacturing establishments, air hoists of every description; to operate canal locks, elevators and clocks; to lift water, acids and other liquids; as a treatment for tuberculosis, by expanding the lungs; to paint broad surfaces, bridges, freight cars, warehouses and buildings; to force plastic material through dies, holes and pipes; to operate mine cars and cars on railroads; to operate motorcycles, automobiles and all forms of horseless vehicles; to inflate pneumatic tires for bicycles and carriages; to drive the sand in a sand blast; to clean carpets, rugs, cars, and for hundreds of other purposes. Following are some of the uses to which compressed air is put in railroad shops: elevating sand at engine house; elevating oil at oil house; hoisting heavy castings and tools; forcing couplings on air hose; operating cylinder-boring bar; operating valve-facing machine; filling cylinders of hydraulic presses; removing and applying driving tires; testing water pumps after repairs; drilling, tapping and reaming with motors; cleaning boilers and machinery; punching jacket rivet holes; taking old paint off tin roofs; chipping, cutting and caulking; operating letter presses; jacking up cars and trucks; cleaning interior of cars and upholstered work; burning paint off coaches and painting cars.

Compressed air is used on the vessels of the United States navy for the following purposes: to operate the main engine auxiliaries; to operate auxiliary, fire, bilge and water-service pumps; to operate boat cranes, turret-turning engines, hydraulic cylinders for working guns, ammu-

nition hoists, ash hydro-pneumatic hoists, feed pumps, smoke hose for guns, whistle and siren; to send messages about the ship through pneumatic tubes; to clear a compartment of water when filled; to ventilate, heat and cool the ship, and to operate the engine of the ordinary working launch. Compressed air also is used in dynamite guns. See AIR BRAKE; PNEUMATIC TOOLS.

Compromise, kom'pro mize, of 1850, a set of compromise measures passed in August, 1850, in the Congress of the United States, their purpose being to allay the strife over slavery by granting concessions to both parties. Under the compromise, Texas was allowed \$10,000,000 for New Mexico; California was admitted to the Union as a free state; New Mexico and Utah were organized as territories, with the right to adopt or reject slavery, and fugitive negroes were denied a trial by jury, but were to be returned to their owners upon certain affidavits. This latter provision was known as the Fugitive Slave Law. The compromise was passed largely through the efforts of Daniel Webster, Henry Clay and John C. Calhoun, each of whom made his last great speech in its behalf.

Compulsory Education. See EDUCATION, COMPULSORY.

Com'stock Lode, a large and extremely rich vein of ore containing gold and silver, in the western part of Nevada, on the eastern slope of the Virginia Mountains. To it belong the Big Bonanza and other mines. During the first twenty years that it was worked, this vein yielded over \$306,000,000.

Comte, koNt, ISIDORE AUGUSTE MARIE FRANCOIS XAVIER (1798-1857), the founder of the positive system of philosophy, or Positivism, was born at Montpellier, France. When sixteen, he entered the polytechnical school at Paris, from which he was expelled two years later. After this he became interested in the socialistic teachings of Saint Simon, from which the doctrines of his own system originated. In 1826 he undertook a series of lectures, but was unable to complete the work, because of temporary mental derangement. After recovery he began systematic work upon the exposition of his doctrines, which he gave in his *Course of Positive Philosophy*, a work consisting of six volumes and requiring twelve years for its preparation. He was for a few years professor of mathematics in the polytechnic school, but was dismissed, and during the remainder of his

life he was supported chiefly by his friends. The fundamental principle of Comte's philosophy is known as "the law of three stages." According to this law, intelligence, whether of the individual or of society, has passed through three stages or periods of development: the *theological* stage, in which supernatural beings are believed to produce all phenomena; the *metaphysical* stage, in which abstractions, such as mental or physical force, are regarded as the causes of all activity, and finally, the *positive* stage, in which the search for ultimate causes is given up, and effort is confined to discovering the actual relations or associations that observation shows to exist among phenomena.

These relations or laws have no other reality than that of existing together in time and that of sequence. They vary in the scope of their application; that is, some are more general than others. On this difference in the application of laws, Comte classified the sciences according to their degrees of complexity. In this classification mathematics constitutes the foundation, because the laws of this science are necessary in all departments of knowledge. Following this, in their order, are astronomy, physics, chemistry and biology, which includes psychology as an essential physiological science, and finally, sociology. Each of these sciences incorporates the laws of that which precedes it and adds laws peculiar to itself. Philosophy is nothing but the correlation of the sciences, by the discovery of their common laws and by the establishment of their separate provinces. There is no higher knowledge than that gained by sense perception, and metaphysical theories are but the inventions of superstition.

In his attempt to create a science of sociology Comte established the fact that the law of social development is not merely to be reasoned from the laws of human nature, but is quite distinct from them. He maintained that the characteristics of society are determined more and more, as time advances, by the social spirit of the past, and less by the natural qualities of human nature; hence a careful study of all phases of historical development is important in order to discover the dominant tendency or law that has determined social progress.

Concepcion, kon sep'se own', a seaport of Chile, South America, capital of a province of the same name, situated 6 mi. from the mouth of the Biobio River and 270 mi. s. s. w. of Santiago. The chief buildings are a cathedral, an agricultural school, a normal school and a

Concept

town hall. The port at Talcahuano, about 8 miles distant, is one of the largest in Chile and has an active trade. Concepcion was founded in 1550 by Valdivia and has been several times nearly destroyed by earthquakes. Population in 1907, 55,330.

Concept, *kon'sept*, in psychology, the name generally given to the idea of a class, or general, notion. The first step in the formation of concepts is the acquisition of individual ideas through the senses (See PERCEPTION). As these ideas are acquired, they are compared and their points of similarity and dissimilarity are noted. The qualities given to the ideas are separated from the others (See ABSTRACTION) and grouped together, forming an idea which applies to all the objects of the class. This idea is a concept. One's idea of *orange*, *apple*, *horse*, applies to all oranges, all apples or all horses, as far as his knowledge of each of these classes of objects extends, and it is not an idea of any particular orange, apple or horse. A concept is an abstract idea consisting of a group of qualities common to all objects to which it can be applied. In this respect it is different from an image. An image is a mental picture of an individual object, which includes all of that object's peculiarities. One's concept of man, if accurate, will apply to all men; but the mental image of one's father includes all of those peculiarities pertaining to the father's personal appearance, such as height, weight, facial expression, color of hair and eyes.

The chief characteristics of a concept are its content and extent. By content is meant the qualities which the concept contains; by extent, the number of objects to which it applies. These characteristics exist in inverse ratio, as the larger the content, the smaller the extent. Since one's concept is built upon his observation, the concept formed by limited observation will have a larger content and a narrower extent than one formed upon broad observation. For instance, a child's concept of *cat* will be limited to the cats which he has seen, and may possibly be confined to those of his own home. If his observation has not extended beyond cats of one color, his concept will include this color. When he sees cats of another color, he will be obliged to modify his concept by rejecting the quality of color. He will then extend it to apply to the new specimens that he has observed. As he goes on in extending his observations, he will continue to reduce the number of qualities in his concept by rejecting those which do not apply to the new specimen, until finally it includes only

Concertina

those qualities that will apply to all cats. It now has its narrowest or smallest content and its widest extent.

The formation of concepts is the first step in thinking (See THOUGHT). It begins early in life and is at first spontaneous. The earliest concepts are very crude, and they need to be perfected through voluntary observation. Parents and teachers can materially assist children in the formation of concepts; by observing the following principles:

(1) There is a vital connection between sensation, perception and the formation of concepts. The child's success in forming class ideas depends upon the care with which he has acquired individual ideas.

(2) The child should be trained to form clear and correct concepts early in life, since the time soon comes when ideas of individual objects obtained through perception will not be sufficient for his needs, and he will have to draw upon the ideas earlier acquired as a basis of comparison, in order that he may correctly classify his knowledge. If his early concepts are correct, his classification will be much more accurate than if these concepts are false.

(3) Concrete illustrations are necessary to enable children to form correct concepts, and these should be chosen with care. They should bring before the child the idea which he should obtain and should be clear and pointed.

(4) One should always be able to change his concepts into images of the individuals for which the concept stands. In other words, one should be able to apply his general notions to individual cases. If he is not able to do this, his concepts are not clear. Much of the difficulty which pupils experience in arithmetic, grammar and other branches arises from their inability to image their concepts, or, in other words, to apply the principles and rules which they have learned to the solution of problems presented to them. This difficulty can usually be avoided if concepts are formed through observation. See INDUCTIVE METHOD; METHODS OF TEACHING, sub-head *Formal Steps in Learning*; JUDGMENT; REASON; THOUGHT.

Concertina, *kon'sur te'nah*, a musical instrument, composed of a bellows, with two faces or ends, generally polygonal in shape, on which are placed the various stops, or studs, by the action of which, manipulated by the performer's fingers, air is admitted to metallic reeds, which produce the sounds. It is an improved form of the accordion.

Conch

Conch, *konk*, a name given to many species of large mollusks, which have a heavy spiral shell that may be used as a trumpet if the end be broken off. In the East Indies the shell of one species is perforated at the tip, fitted with a mouthpiece and used as a musical instrument. In the United States there are two different kinds of shells called conchs; from one of these the indians made their white wampum. The egg cases of these mollusks are disc-shaped and look like leathery circles strung upon a cord.



CONCH

Conchology, *kon kol'ojy*. See SHELLS.

Conciergerie, *koN syair'zh're'*, LA, the famous prison in Paris, where political prisoners were kept during the French Revolution. Male-sherbes, Madame Roland, Danton, Desmoulins, Robespierre and Marie Antoinette were confined there. The prison is still used as a place for temporary detention.

Con'clave, the assembly of the cardinals for the election of a pope. A two-thirds vote is necessary for an election. The cardinals meet in a large hall, which has been made into small rooms, three of which are given to one of princely rank and two to an ordinary cardinal. After the first day the cardinals are locked in and are allowed no communication with the outer world till after the election takes place. Even the food, passed through a window, is thoroughly examined that no letters or notes may reach the members of the Sacred College.

Con'cord, MASS., a town of Middlesex co., near the Concord River, 18 mi. w. n. w. of Boston. Here, at Concord Bridge, April 19, 1775, the first shots of the American Revolution were fired, and a monument on the bank of the river marks where two English soldiers fell. It is famous as the home of Ralph Waldo Emerson, Hawthorne, Thoreau and Alcott. Population in 1910, 6421.

Concord, N. C., the county-seat of Cabarrus co., 21 mi. n. e. of Charlotte, on the Southern railroad. It was incorporated in 1793 and is a very old city; but new industries have been introduced in recent years, and the place has experienced a rapid growth. There are foundries, machine shops, rolling mills and manufactures of cotton goods and other articles. Population in 1910, 8715.

Concrete

Concord, N. H., the capital of the state and the county-seat of Merrimac co., 75 mi. n. w. of Boston, on the Merrimac River and on the Boston & Maine Railroad. The noteworthy buildings include the statehouse, lately remodeled, the federal building, the courthouse, the state insane asylum and the State Library. Saint Paul's school for boys is located here. The quarrying of granite in the vicinity is the leading industry. The manufactures include carriages, shoes, leather, cotton and woolen goods, silverware and pianos. Concord was founded in 1725 as Pennacook, and it was incorporated as Rumford eight years later, but was renamed Concord in 1765 and incorporated as a city in 1853. The town suffered greatly from an Indian massacre in 1746. Population in 1910, 21,497.

Concord, BATTLE OF. See LEXINGTON, BATTLE OF.

Concor'dance, an index in which all the important words of any work are arranged alphabetically, with references to show where each word occurs. This sort of concordance is called a *verbal* concordance, while a similar work in which subjects are indexed is known as a *real* concordance. By far the greatest number of concordances treat of the Bible, and the first of these was made by Anthony of Padua, early in the thirteenth century. The best concordances of the English Bible are Cruden's, Robert Young's and James Strong's. Concordances have been made for Shakespeare, Tennyson, Milton, Pope, Dickens and others.

Concrete, *kon'kreet*, a composition used in building, consisting of hydraulic, or other, mortar, mixed with gravel or stone chippings about the size of a nut. Ordinary builders' concrete is made of one part of cement, three parts of sand and six parts of crushed stone. Concrete seems to have been used by the Romans, and even by the ancient Babylonians and Egyptians. Cement is used extensively in building under water; for example, to form the bottom of a canal or sluice, or the foundation of any structures raised in the sea; and it is also frequently used to make a bed for asphalt pavements, or to form foundations for buildings of any kind. It is becoming increasingly common as a material with which the walls of houses are built, the concrete being firmly rammed into moulds of the requisite shape, and then allowed to set. Concrete, reinforced by steel rods or bars, which are put in place before the concrete is molded, is now extensively used for factories and industrial plants of all

Conde

kinds; it is cheaper than ordinary steel construction and fully as durable.

Conde, *koN da'*, LOUIS DE BOURBON, Prince of (called the *Great Condé*) (1621-1686), a famous French general. His first noteworthy exploit, the defeat of the Spanish at Rocroi, in 1643, was followed by his defeat of Mercy at Nördlingen and by his capture of Dunkirk, in the year in which he inherited his father's title. During the troubles of the Fronde he at first took the side of the court; but believing himself to be ill-treated by Mazarin, he put himself at the head of the opposite factions and was imprisoned for a year by Mazarin. On his release he at once recommenced his resistance to the court, entered upon negotiations with Spain and, his attack on Paris being indecisive, retired to the Netherlands, where he was appointed commander in chief of the Spanish armies. In this capacity he unsuccessfully besieged Arras, but he was more fortunate at Valenciennes and at Cambrai. He was defeated before Dunkirk by Turenne, but was restored to his rank in France after the peace of 1659. In 1668 he accom-



CONDOR

plished the reduction of Franche Comté in three weeks. His successes over Montecuculi in Alsace closed his military career.

Condensed Milk. See MILK, CONDENSED.

Con'dor, the largest of the birds of prey. Its length sometimes exceeds 50 inches and its expanse of wing 10 feet. The home of the

Confederate States of America

condor is in the South American Andes, where it lives in small flocks, laying its eggs on the bare mountain rocks. The condors live upon dead animals and decaying flesh, but under pressure of hunger they sometimes attack live goats, sheep, deer and even bullocks. In color the condor is black, with whitish wings and a white downy ruff around the neck. Above its ruff the neck is bare and the skin is folded in great wrinkles. The male has a comb and wattles of red skin.

Conduc'tor, ELECTRICAL. See ELECTRICITY, subhead *How Electricity Travels*.

Cone, a geometric solid, generated by a right-angled triangle, revolved about one of the sides that contain the right angle. Its volume is equal to the area of its base multiplied by one-third of its altitude (that is, the perpendicular distance between its apex and its base). The area of its surface, excluding the base, is equal to the circumference of its base multiplied by one-half its slant height. See CONIC SECTIONS.

Co'ney Island, N. Y., in Kings co., a popular resort, situated at the southwestern end of Long Island. It is famous historically as the place of Henry Hudson's landing in 1609. All parts of the island are reached by railroad lines from New York City, Jersey City and Brooklyn. It was annexed to Brooklyn in 1894. During the summer months it is crowded with pleasure seekers from many parts of the country.

Confectionery, *kon fek'shun er'y*. See CANDY MAKING.

Confed'erate States of Amer'ica, the federation formed in 1861 by the eleven states which seceded from the Union. The convention of South Carolina passed an ordinance of secession, Dec. 20, 1860, and expressed the hope that the other states contemplating secession would join in a federation. Three weeks later the convention of Mississippi indorsed this proposal, as did also the convention of Florida, January 10. On January 11, the convention of Alabama recommended that the seceding states send delegates to a congress called to meet at Montgomery, Ala., February 4, 1861, to form a federation. South Carolina, Mississippi, Florida, Alabama, Georgia and Louisiana were represented in this convention and organized as a Provisional Congress of the Confederacy. On February 8, a temporary constitution was adopted, to be in force for one year from the inauguration of the president or until a permanent constitution should be adopted. Jefferson Davis of Mississippi was chosen temporary

president and Alexander H. Stephens of Georgia, temporary vice-president. The congress enacted that all laws of the United States in force in the Confederate States on Nov. 1, 1860, and not inconsistent with the constitution of the Confederacy, be continued in force until repealed or altered by the Confederate congress. The more important congressional committees—on war, finance and foreign relations—were appointed at once. During the year 1861 Texas, Arkansas, Virginia, North Carolina and Tennessee passed ordinances of secession and joined the Confederacy. On March 11 a permanent constitution was adopted by the congress and

eracy, among the members being men of exceptional ability, as Robert Toombs and Judah P. Benjamin.

The first important act of the congress was to make provision for a permanent army. It then devoted itself to seeking foreign recognition and assistance and to building up a financial system for the support of the government. From the first, however, it also sought peace upon the basis of the separation of the North and South, but all efforts in this direction were vain. On Nov. 6, 1861, Davis was chosen permanent president and Stephens permanent vice-president of the Confederacy by a unanimous vote. Dur-



THE CONFEDERATE STATES OF AMERICA

submitted to the various states for ratification. This constitution was in general similar to that of the United States, but differed from it in some important respects: The term of the president was fixed at six years, and he was ineligible for reelection; slavery was sanctioned, and slaveholders were given the privilege of taking their slaves into any state or territory; cabinet officers were given seats in congress, according to the system prevailing in Great Britain; the states expressly retained their sovereignty. Meantime, the executive departments had been organized, and President Davis had chosen his cabinet, which represented every state in the Confed-

ing the next few months the extraordinary demands made upon the government by the war and the necessity of using all the capable soldiers in military capacities led to a decline in the strength of congress as a body, and the consequent centralization of power in the hands of the executive, and especially of President Davis. His services, therefore, as head of both the civil and military administrations of the Confederacy, involved tremendous responsibilities, and he was not free from criticism, especially directed at the gradually growing supremacy of the military over the civil law, and at the extraordinary orders and decrees

Confederate Veterans

which he found necessary in order to secure support for the government. The chief difficulties of the Confederacy were due to the lack of funds; for the import duties, which under ordinary conditions would have constituted the chief source of revenue, were almost entirely excluded by the blockade, and there was also a strong sentiment against the imposition of internal taxes. The government was finally compelled to issue vast sums in paper money, or government notes, and to exchange government bonds for provisions and ammunition. The confusion was increased by the issuance by states, cities, banks, corporations and even private citizens, of notes for circulation as money. The decline in value of this money naturally led to an increase in the price of all commodities, and during the war the price of flour was at times \$400 per barrel, shoes sold at \$150 a pair, the use of tea and coffee was practically abandoned, ice was used only by the most wealthy citizens, and such common necessities as coal, wood, medicines and salt were classed as luxuries.

The permanent senate and house held two sessions, the final adjournment being taken March 18, 1865, about a month before the close of the struggle.

Confed'erate Vet'erans, UNITED, a patriotic society composed of veterans of the Confederate army, organized at New Orleans, La., in 1889, for the purpose of strengthening the friendships formed during the war, preserving the memory of dead comrades and aiding veterans and their widows and orphans. The organization is supported by 1600 local *camp*s, divided into three departments, and it includes about 75,000 members. It holds annual reunions.

Confederate Veterans, UNITED SONS OF, a patriotic society composed of the male descendants of Confederate veterans, organized at Richmond, Va., in 1896, for the purpose of gathering and preserving historic relics and data, from which to write a history of the Civil War from the Southern standpoint. The organization is divided into three departments and many local *camp*s, and has a membership of about 10,000. In 1902 it purchased *Beauvoir*, the home of Jefferson Davis, which will be used hereafter as a home for Confederate veterans.

Confed'era'tion, ARTICLES OF, the written instrument of government adopted by the thirteen states in America in 1781. They were the work of a committee appointed upon the same day as was the committee to draw up the Declaration of Independence. The Articles were

Confucius

reported to Congress July 12, 1776, but a prolonged debate ensued and they were not adopted until November, 1777. They were then sent to the state legislatures, whose unanimous consent was necessary to their final adoption. By May, 1779, all the states except Maryland had ratified the Articles, but Maryland demanded that the states should first cede their territorial claims in the Northwest Territory to the Federal government. This being done, Maryland signed the articles, March 1, 1781. The Articles provided for a "firm league of friendship," under the title *United States of America*, and declared that each state should retain its sovereignty and all the rights and powers which were not expressly delegated to the United States. The government was to be in the hands of Congress, composed of not less than two nor more than seven delegates from a state, each state having, however, but one vote. Congress could decide disputes between the states. It had no power to regulate commerce or to raise revenue; it could declare war, but could not raise troops; it could make appropriations, but could not collect taxes; it could pass laws, but could not compel their observance; it could borrow money, but could not guarantee its repayment. Under this weak and decentralized government, conditions in the colonies became grave, and the conviction became widespread that a new government must be formed, possessing more powers than did the one created by the Articles. The result was the constitutional convention and the Federal Constitution adopted in 1787.

Confucius, kon ju'she us, or Kongfutse (that is, the teacher, Kong) (550-478 B. C.), the famous Chinese sage, was born in the province of Shantung, then belonging in part to the small vassal kingdom of Lu. His father, who was of royal descent, died three years later, and the boy was reared in comparative poverty by his mother. At the age of seventeen he was made inspector of corn markets; at nineteen he married, and after about four years, in which a son and two daughters were born him, he commenced his career as a teacher. In 517 B. C. he was induced by two members of one of the principal houses in Lu, who had joined his band of disciples, to visit the capital with them, where he had interviews with Lao-tze, the founder of Taoism. Though temporarily driven from Lu to Tsi by a revolution, he soon returned thither with an increased following, and at the age of fifty-two he was made chief magistrate of the city of Chung-too. So striking a refor-

mation was effected by him that he was chosen minister of crime, and with the aid of two powerful disciples, he elevated the state of Lu to a leading position in the kingdom. Its marquis, however, soon after gave himself up to debauchery, and Confucius became a wanderer in many states for thirteen years. In 483 he returned to Lu, but he would not take office. The deaths of his favorite disciples did much to hasten his own end. Confucius left no work detailing his moral and social system, but the five canonical books of Confucianism are the *Yih-king*, the *Shu-king*, the *Shi-king*, the *Le-king* and the *Chun-t sien*, with which are grouped the "Four Books," by



CONFUCIUS

disciples of Confucius, the *Ta-heo*, or *Great Study*, the *Chung-Yung*, or *Invariable Mean*, the *Tun-yu*, or *Philosophical Dialogues*, and the *Hi-tse*, written by Meng-tse. By a strange fate, Confucius, who avoided the subject of immortality, was deified after his death. The teaching of Confucius has had, and still has, an immense influence in China, though he can hardly be said to have founded either a religion or a philosophy. All his teaching was devoted to practical morality and to the duties of man in this world in relation to his fellow men; in it was summed up the wisdom acquired by his own insight and experience and that derived from the teaching of the sages of antiquity. Every market town, district, sub-prefecture and prefecture in China must, by law, contain a temple to Confucius. The emperor goes twice

a year on fixed days to the Imperial College at Peking, where he does homage to the great sage. Confucius has many descendants.

Conger, EDWIN HURD (1843-1907), an American diplomat, born in Knox co., Ill. He was educated at Lombard University, Galesburg, Ill., enlisted in an Illinois regiment in 1862 and served during the war, being promoted to captain and brevetted major for gallant conduct. Mr. Conger practiced law in Galesburg, but removed to Dexter, Iowa, in 1868, and soon became prominent in the Republican party. He was elected state treasurer in 1880; represented his district in Congress, and was appointed United States minister to Brazil by President Harrison. He was transferred by President McKinley to Peking, where, through his dignified administration during the Boxer uprising, he won a wide reputation as a diplomat. He was appointed ambassador to Mexico in 1905, but soon resigned.

Conger Eel, a genus of marine eels, characterized by a long dorsal fin, beginning near the nape of the neck, immediately above the base of the pectoral fins. It is pale brown above and grayish-white below. It grows to a length of eight feet and to a weight of thirty pounds. In some places along rocky European coasts it is quite common.

Conglom'erate, a term applied by geologists to rocks consisting mostly of water-worn pebbles, or angular fragments cemented together by silica, lime, iron or some other substance, which usually forms the main body of the rock. When the rock contains a large number of pebbles, it is called *pudding stone*, because of its resemblance to a plum pudding. When angular fragments are cemented together, they form *breccia*. See BRECCIA.

Con'go Free State. See KONGO-FREE STATE.

Congo River. See KONGO RIVER.

Congrega'tionalists, THE, a religious denomination, receiving its name from the belief of the members that every congregation of Christians should be an independent body. In England the Congregationalists are known as Independents, the separate churches being formed so that each congregation may have the form of worship which its members desire. Every Congregational church has the right to elect or depose its officers; to discipline its members, and to determine its own way of worship. There is no appeal to a higher church or to any high church official or conference.

Congress

but the advice of neighboring churches is often sought. The officers of the church are the pastor, deacons and clerk, a treasurer and a Sunday school superintendent. The expenses of Congregational churches, including the salary of the pastor, are met by voluntary offerings. The local churches are organized into state associations, and a national council meets every three years and is composed of members elected by the state organizations.

In the United States the Congregational Church is relatively strongest in the New England and Eastern states. It has always stood for higher education, and among the institutions founded by it, or its members are Yale, Dartmouth and Amherst Colleges and Andover Theological Seminary, in the East; and Oberlin College and Chicago Theological Seminary in the central part of the country. The denomination in the United States has about 735,000 communicants, and about 660,000 persons enrolled in its Sunday schools.

Congress, an assembly of the delegated representatives of sovereign states, for the purpose of considering matters of international interest. The term is used in America in a slightly different sense, but it has a similar origin, the first congress being that of the delegates from various British colonies, who met Oct. 7, 1765. The name has been applied to many important meetings, at which extensive schemes of future policy were determined by the great powers of the world. To this class belong the famous Congress of Vienna in 1815; that of Carlsbad in 1819, for regulating the affairs of Germany; that of Paris at the end of the Crimean War of 1854-1856; that at Berlin after the Russo-Turkish War of 1877-1878, and that which arranged for the partitioning of Africa in 1885. The word congress is often used interchangeably with conference. See CONGRESS OF THE UNITED STATES.

Congressional, *kon gresh' un al*, **Library**, See LIBRARY OF CONGRESS.

Congressional Record, the daily printed report of the proceedings of the Congress of the United States. From 1789 to 1824 this was known as the *Annals of Congress*; from 1825 to 1837, as the *Register of Debates*; from 1837 to 1874 as the *Congressional Globe*. It does not contain an accurate record of the actual proceedings of Congress, since members are often allowed the right to insert speeches which they have never delivered, or to revise remarks which they have made before the House.

Coniferae

Congress of the United States, the national legislature of the United States. It is composed of two houses, the upper house, known as the Senate, containing two representatives from each state of the Union, chosen by popular vote; the lower house, known as the House of Representatives, containing representatives of the whole people, apportioned according to the population of the states. See LEGISLATURE; UNITED STATES, subhead *Government*; see, also, Vol. VI, CIVIL GOVERNMENT.

Con'greve, WILLIAM (1670-1729), an English dramatist. His plays belong to the artificial school of comedy, which aimed rather at the production of a sustained flow of wit than at the precise delineation of character. The immorality by which they are marred is perhaps the fault of the age rather than of Congreve.

Con'ic Sections, three curves, the hyperbola, the parabola and the ellipse, so called because they are formed by the intersection of the surface of a cone with planes that cut the cone in various directions. If the cutting plane be parallel to the axis, the curve formed is the *hyperbola*; if parallel to the slope of the cone, the curve is a *parabola*; if passing through both sides of the cone obliquely, the section is an *ellipse*. A section perpendicular to the axis of the cone forms a *circle*, which may also be considered one of the conic sections.

Coniferae, *kon if' eree*, or **Pine Family**, a large group of trees and shrubs which are found in the north and south temperate regions, with very few within the tropics. By the peculiar structure of their flowers they are separated widely from most of the flowering plants, and with three other small families they are known as gymnosperms. The trees have a somewhat uniform habit of growth. Usually the branches grow out horizontally and diminish in length toward the top, giving a characteristic cone-like appearance to the whole tree. The leaves are slender and needle-like, or in the form of flat scales; and as on many species they persist through the winter, they have earned for the trees the name of *evergreens*. The name *coniferae*, or cone-bearing, is given these trees because of their peculiar fruit, which is cone-shaped and composed of heavy scales, under which are borne the seeds. In some species these are long in ripening, and the scales cling firmly together until the seeds are ready for distribution, at which time the scales open and the seeds are blown about by the wind. The stamens are borne in small and usually inconspicuous cones, which fall as soon as the

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pollen has been distributed by the wind. They are so removed from the fertile cones that the latter can be fertilized only by the wind, and in consequence the yellowish pollen is composed of countless minute grains which fly about as a yellow dust. Not all the coniferae, however, bear cones. Some, as the juniper, form berries. Some species are very widely scattered, while others are closely restricted to certain localities. See CYPRESS; FIR; HEMLOCK; LARCH; PINE; SEQUOIA; SPRUCE; YEW.

Conjunction, *kon junk'shun*, in astronomy, the position of two of the heavenly bodies, as two planets, or the sun and a planet, when they are in the same direction from the earth. Sometimes one appears to cover the other, or the two appear to occupy the same spot in the heavens; and when this happens with the sun and the moon we call the phenomenon an *eclipse*. When a star and the moon are in conjunction it is called an *occultation*. When it is simply said that a planet is *in conjunction*, conjunction with the sun is to be understood. The planets nearer to the sun than the earth are said to be in *superior* conjunction or *inferior* conjunction, according as the sun is between them and us, or they are between the sun and us.

Conjunction, in grammar, the part of speech which connects words, sentences or phrases which have the same grammatical connection. They are of two kinds: *coordinating* conjunctions, which connect words, phrases or sentences of the same rank, as "The army rushed forward *and* fell upon the enemy"; and *subordinate* conjunctions, which introduce dependent clauses, as "They could not advance *because* the bridges were destroyed." Conjunctions which are used in pairs, as *both—and*, *not only—but also*, are called *correlative* conjunctions.

Conjunctivitis, *kon junk'ti vi'tis*, or **Ophthalmia**, *of thal'mi a*, an inflammation of the mucous membrane of the eye socket and the outer surface of the eyeball. There are a number of distinct varieties of the disease, occasioned by differing causes. These varieties vary from the slight inflammation caused by an acute attack of catarrh to a purulent form that is highly contagious and frequently destroys vision. *Granular conjunctivitis*, or, as it is usually known, *granular lids*, is a contagious trouble, which is readily communicated by towels or wash basins that are not carefully cleaned. This is a common disease in crowded prisons or even in schools that are carelessly supervised.

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In some parts of the world it is exceedingly common. In Egypt the greater part of the native population are suffering from it, and a large per cent of the adults have had their sight permanently injured by it. Ophthalmia need not be acquired by a person who is habitually cleanly and careful in the use of public towels or bathing places, and the disease is promptly curable if intelligent measures are taken.

Conk'ling, ROSCOE (1829-1888), an American politician, born in Albany, N. Y. In 1850 he was admitted to the bar and in the same year became district attorney for Oneida county. In 1858 he was elected mayor of Utica and within a few months was rewarded for long political activity by nomination and election to Congress. He served several terms, and in January, 1867, took his seat in the United States Senate, being reelected in 1873 and in 1879. He vigorously supported Grant in his campaign for the presidential nomination in 1880, and he was extremely hostile to President Garfield's administration, claiming, with his colleague, Thomas C. Platt, the right to control federal appointments in his state. They finally resigned their seats in the Senate and appealed to the legislature of New York for a reelection as a vindication of their course, but they were unsuccessful. Conkling declined the nomination of justice of the United States Supreme Court and practiced law until his death.

Conneaut, *kon ne awt'*, OHIO, a village in Ashtabula co., 62 mi. n. e. of Cleveland, near the Pennsylvania state line, on Conneaut Creek and on the Lake Shore & Michigan Southern and several other railroads. The first white settlers of northern Ohio landed here in 1796, and it was incorporated as a village in 1832. There is a good harbor, and considerable ore, coal, sand and agricultural produce are exported. The place contains railroad shops, and canning and other factories. Population in 1910, 8319.

Connecticut, *kon net'i kut*, the NUTMEG STATE, also, *Land of Steady Habits*, one of the original thirteen states, is situated in the southern part of New England and is bounded on the n. by Massachusetts, on the e. by Rhode Island, on the s. by Long Island and on the w. by New York. Its average length is 95 miles, and its average breadth, 55 miles. The total area is 4965 square miles, making Connecticut the third smallest state. Population in 1910, 1,114,756.

SURFACE. Connecticut occupies the southern slope of the hill region of New England, and its surface includes three great river valleys, which

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cross the state from north to south and are separated from one another by ranges of low hills. In the eastern part of the state is the valley of the Thames, which, with its two tributaries, drains this part of the state into Long Island Sound. The Connecticut valley occupies the central part of the state. The western part of the state is traversed by the Berkshire Hills, which are a continuation of the ranges crossing Massachusetts. This region has a diversified surface, the hills being interspersed with numerous valleys containing small streams. There are a number of low mountains in this region, the highest being Bear Mountain, which attains an altitude of 2354 feet. Other peaks worthy of mention are Gridley Mountain, Riga Mountain, Bradford Mountain, Dutton Mountain and Mount Ball. The southern portion of the state along the coast is quite low and level, but inland the surface is everywhere characterized by low hills, all of which are more or less stony. Along the streams are narrow, level flood plains, usually called meadows.

CLIMATE. The climate is subject to sudden changes, the winters are quite severe and among the hills and mountains the snows are usually deep. The summers are hot. The rainfall is everywhere sufficient for agricultural purposes. The climate is considered healthful, and the pleasantest season is autumn.

MINERAL RESOURCES. Hematite occurs in a number of places, and some of the iron mines have been worked since 1732. There are also deposits of lead, nickel, cobalt and other metals, but not in sufficient quantities to pay for working. The brown sandstone, known as brownstone, and valued so highly for the construction of residences, is quarried near Middletown. There are also quarries of marble, flagstone, feldspar and stone suitable for the manufacture of lime and cement. The annual output of mineral products is about \$1,500,000.

AGRICULTURE. Agriculture is not a leading industry, but the soil in general is fertile, and most of it is tilled. The chief crops are corn, rye, oats, potatoes and hay. The nearness to New York and other large cities affords the Connecticut farmer a good market for garden produce, and truck farming is quite extensive along the streams. Dairying is also an important industry. Connecticut raises large quantities of tobacco. Much of this is grown in fields protected by a cover of thin muslin, which is stretched over frames that rise a few feet above the plants.

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MANUFACTURES. Connecticut is one of the leading manufacturing states of the Union. According to government statistics it produces three-fourths of the ammunition, more than half of the brass products, more than sixty per cent of the clocks, nearly half of the hardware, over three-fourths of the plated and Britannia ware, and nearly sixty-five per cent of the needles and pins made in the United States. Besides these industries, others which have attained large proportions are the manufacture of rubber goods, textiles, including cottons, woolens and silk fabrics, and machinery. New London has an extensive shipbuilding plant, where some of the largest steamers afloat have been constructed. The development of Connecticut's manufacturing industries is due to her favorable location in reference to large cities, to the abundance of water power and to the ingenuity of her people. In proportion to population, more patents are owned and controlled by the citizens of Connecticut than by those of any other state.

TRANSPORTATION. The Connecticut River is navigable for steamers to Hartford, and beyond for small boats, and the Thames is navigable as far as Norwich. The state contains over 1000 miles of railway, nearly all of which is owned or leased by the New York, Hartford & New Haven system. Electric railways are found in all of the important towns, and numerous lines have been constructed connecting adjoining cities, so that the state is well provided with transportation facilities. The numerous inlets on the coast provide good harbors, and New London, New Haven and Stonington are important ports. The state carries on an extensive commerce, owing to its great variety of manufactures. The exports consist of agricultural and dairy products and manufactures, while the imports include food products and raw material for the factories.

EDUCATION. Connecticut maintains a good system of public schools, supported in part by income from the state school fund and in part by local taxation. There are normal schools at Danbury, New Britain, New Haven and Willimantic. The state agricultural college is located at Mansfield, and among higher institutions of learning the most noted are Yale University at New Haven, Wesleyan University at Middletown, Trinity College at Hartford and Hartford Theological Seminary.

The state maintains a hospital for the insane at Middletown and a school for the feeble-minded at Lakeville, also two institutions for

the deaf and one for the blind. There are also numerous hospitals and sanitariums, and each county has a temporary home for the indigent. The state's prison is at Wethersfield, and there is an industrial school for girls at Middletown and one for boys at Meriden. All of these institutions are under the supervision of a state board of charities.

CITIES. The important cities are Hartford, the capital, New Haven, Bridgeport, Waterbury, New London and Danbury, each of which is described under its appropriate title.

HISTORY. The territory of Connecticut was granted to the Plymouth Company in 1606 and was explored by the Dutch in 1614. In 1623 they established a trading post at Hartford. Meantime, the English had become interested in the region, and in 1631 the land from Narragansett Bay to the Pacific was granted to Lord Say and Sele, who soon afterward founded Saybrook. Early in 1636 Thomas Hooker led his congregation westward from the coast and settled at Windsor, near Hartford. Others followed and established English towns in the neighborhood. English Puritans founded a settlement at New Haven in 1638, which was to be governed largely by the Scriptures. Both the Connecticut and New Haven settlements expanded, and the former became known as one of the most prosperous and liberal of the New England colonies. Connecticut absorbed New Haven in 1662. In the struggle against the crown to obtain the charters, Connecticut took a prominent part, and when Governor Andros appeared in 1687 to demand the charter, it was hidden away until 1693. In the French and Indian Wars, Connecticut took an active part, and, also, in the pre-Revolutionary discussion. The state furnished the Continental army about 30,000 men, was one of the first to form an independent government (1776) and the war governor, Jonathan Trumbull, was one of the closest friends and advisers of Washington. Connecticut suffered through raids against its defenseless towns, the last one being directed by the traitor Benedict Arnold, in September, 1781. Its representatives, Sherman, Johnson and Ellsworth, were prominent in the constitutional convention and proposed the present system of representation, by states in the Senate and according to population in the House of Representatives. Connecticut opposed the War of 1812 and was prominent in the Hartford Convention in 1814 (See HARTFORD CONVENTION). The sentiment of the state was against

slavery and in favor of union, when the crisis in the slavery struggle came. The war governor, Buckingham, was a prominent figure in the period. Hartford and New Haven were long the joint capitals of Connecticut, but the former became the sole capital in 1873. The state has been doubtful politically for many years, but it is inclined to be Republican. Population in 1910, 1,114,756. Consult Johnston's *Connecticut*, in American Commonwealths Series.

Connecticut River, the largest river in New England. It rises on the north border of New Hampshire, forms the boundary between Vermont and New Hampshire, passes through the west part of Massachusetts and the central part of Connecticut and falls into Long Island Sound. It is about 375 miles long and drains an area of over 1100 square miles. It is navigable for large steamers for about 50 miles from its mouth. The chief affluents that enter it are the Passumpsic, White, Deerfield, Farmington and Chickopee rivers.

Connective Tissue, one of the elementary structures of the body. It forms the bones, cartilages, ligaments and a framework for nervous, glandular and muscular tissue. Connective tissue includes the areolar, adipose, retiform, white fibrous, yellow elastic, cartilaginous and osseous. The *areolar* tissue is widely distributed, as it is found in the true skin, in the outer sheaths of blood vessels and in the mucous membranes. It makes the sheaths for glands, nerves and muscles and connects the finest parts of the different organs. It is composed of bundles of fine fibers, interlacing in every direction. *Adipose* tissue, found in nearly all parts of the body, but most abundant under the skin and around the kidneys, is not found in the substance of the lungs and some other organs. It exists in small lobules, or masses, surrounded by areolar tissue. No nerve fibers terminate in the fatty tissue, but it contains blood vessels. *White fibrous* tissue is arranged in wavy parallel bundles which give to the surface of tendons the appearance of watered silk. It constitutes the tendons of the muscles, the ligaments around joints, is found in the periosteum, pericardium, the largest tissues around the muscles and the sclerotic coat of the eye. *Yellow elastic* tissue, as its name implies, is very elastic and can often be extended sixty per cent of the length before breaking. It is found in the skin, the trachea, the true vocal cords and in veins. *Cartilaginous* tissue differs from other connective tissue in density and is composed of cells imbedded in a

substance called the matrix (See CARTILAGE). It contains no nerves. It furnishes attachment for muscles and ligaments, binds bones together and keeps the larynx and trachea in their tubular shape. *Ossseous* tissue makes the solid part of the bone (See BONE).

Con'nellsville, PA., a borough in Fayette co., 60 mi. s. e. of Pittsburg, on the Youghiogheny River and on the Baltimore & Ohio and the Pennsylvania railroads. It is the center of a coke region which produces more than one-half the total output of the United States and more than three-fourths of that of Pennsylvania. There are also machine shops, automobile works and one of the largest lock factories in the country. It was settled in 1770 and became a borough in 1806. Population in 1910, 12,845.

Con'nersville, IND., the county-seat of Fayette co., 60 mi. s. e. of Indianapolis, on the White Water River and on the Cincinnati, Hamilton & Dayton and other railroads. There are natural gas wells in the vicinity. The manufactures of the city include carriages and carriage parts, furniture and flour. The town was incorporated in 1813. Population in 1910, 7738.

Con'nor, RALPH. See GORDON, CHARLES WILLIAM.

Con'sanguin'ity. See RELATIONSHIP.

Consciousness, *kon'shus nes*. See PSYCHOLOGY.

Conscript'ion. See DRAFTING.

Conservation, the name given a movement originated in 1908 by President Roosevelt, and having for its purpose the preservation for the people of the natural resources still under control of the National Government. In May the president called a conference of the governors of all the states and other representative men to meet in Washington to consider measures for preserving the public lands, streams, forests and minerals from monopolies and from unnecessary waste. Following this meeting, on June 8 the president appointed a national conservation commission, consisting of 48 members and representing all states and territories. This commission organized with Honorable Gifford Pinchot as chairman, and was divided into the following sections: water resources, land resources, forest resources and mineral resources. A commission was also appointed to devise plans for the cooperation of the various state governments with the National Government.

The Natural Conservation Association was organized in 1909, and has permanent headquarters in New York City. Its purpose is to

unite in one great national organization all who take an active interest in the conservation movement. There are also associations which embrace only sections of the country, as the southern and western associations.

The second National Conservation Congress convened in Saint Paul, September 5, 1910, and recommended several important measures, among them being the continuance of the reclamation service, the maintenance of a federal commission empowered to deal with all uses of waters, the withdrawal of public lands pending classification, the separation of surface rights from mineral, forest and water rights and the leasing by the government of public lands containing mineral fuels, iron ores and phosphates.

Conservative, in Great Britain and Canada, the political party which favors the maintenance of existing conditions rather than the introduction of radical reforms. The Conservatives in England are the successors of the Tories. See LIBERAL; TORY.

Conservatory, a school giving instruction in all branches of music. Conservatories were originally benevolent establishments attached to hospitals, charitable or religious institutions. In France the musical school established in connection with the Opera in 1795, under the name of *Conservatoire de Musique*, is now the most famous school of music in the world. The Conservatorium at Leipzig is perhaps the most influential in Germany. The most noted American conservatories are the National Conservatory in New York, the New England Conservatory in Boston and the Peabody Institute in Baltimore.

Con'shohock'en, PA., a borough in Montgomery co., 13 mi. n. w. of Philadelphia, on the Schuylkill River and on the Philadelphia & Reading and the Pennsylvania railroads. It has rolling mills, foundries, furnaces, cotton and woolen mills and pottery works. The place was founded in 1830 and was incorporated in 1852. Population in 1910, 7480.

Consid'era'tion. See CONTRACT.

Con'sole, in architecture, a projecting ornamental bracket, often in the form of a scroll or letter S. It is employed to support a cornice, bust, vase or the like, but it is an almost purely decorative element. See BRACKET; CORBEL.

Con'sonant, a letter so named because it is usually sounded in connection with a vowel. Some consonants have hardly any sound, even when united with a vowel, serving then merely to determine the manner of beginning or ending

the vowel sounds; as in *ap, pa, at, ta*. In uttering a consonant there is always greater or less obstruction of the breath by the organs of speech; in uttering a vowel the vocal passage is open, though modified in shape.

Conspir'acy, in law, a combination of two or more persons to accomplish an unlawful purpose or a lawful purpose by unlawful means. According to modern statutes in the United States, it is necessary, in order for the offense to be complete, that some open act to accomplish the object of the conspiracy be committed. In this case the offense amounts to a felony and is punishable accordingly.

Constable, *kun'sta b'l*, ARCHIBALD (1774-1827), a Scottish bookseller and publisher. He was the publisher of the *Edinburgh Review*, the poems of Sir Walter Scott, the *Waverly Novels* and an addition to the *Encyclopaedia Britannica*.

Constable, JOHN (1776-1837), an English landscape painter, founder of the modern art of landscape painting. His paintings at first attracted no particular notice, and it was not until 1823 that he found recognition. At that time some of his pictures were exhibited at the French Salon, and the king honored him. In 1829 he was admitted to the Royal Academy. His careful studies of landscape, in respect to tone, were of great influence in art. Some of his best productions are *Cornfield*, *Valley Farm*, *Hay Wain*, *The Cottage* and *Glebe Farm*.

Con'stance, LAKE, a lake in central Europe, at the north base of the Alps, bounded by Switzerland, Austria and the German states of Bavaria, Baden and Württemberg. It extends northwest and southeast, and at its northwest extremity it divides into two branches, the north being called Ueberlingen See, and the south, Untersee, or Zeller See. The Rhine enters it at the south and flows out at the northwest. Lake Constance is about 40 miles long and 9 miles wide.

Constantine, *kon'stan tine*, ARCH OF, a triumphal arch in Rome, dedicated to Constantine, in 315, in memory of his victory over Maxentius. It is the best preserved specimen of ancient Roman monuments, having escaped the ravages of the Middle Ages, probably because Constantine was a Christian emperor.

Constantine, CAIUS FLAVIUS VALERIUS CONSTANTINUS (274-337), Roman emperor (surnamed *The Great*), son of the emperor Constantine Chlorus. After the death of his father in 306, he was chosen emperor of the West by the soldiery and in 325 he became the sole head of the Roman Empire. His inter-

nal administration was marked by a wise spirit of reform. In 329 he removed his capital from Rome to Byzantium, which was called after him Constantinople and which soon rivaled Rome herself. In 337 he died near Nicomedia, leaving his empire to be divided among his three sons, Constantine, Constantius and Constans.

Constantine I (1868-), king of Greece, oldest son of George I. In 1889 he married the Princess Sophia, sister of Emperor William II. He entered the army and rose to important commands. In the war of the Balkan allies against Turkey, in 1912-1913, his personal bravery and the brilliant successes of his troops made him a public idol. Constantine succeeded to the throne on the assassination of his father, March 18, 1913.

Constan'tino'ple (city of Constantine), a celebrated city of Turkey in Europe, capital of the Turkish Empire, situated on a promontory jutting into the Sea of Marmora, having the Golden Horn, an inlet of the latter, on the n. and the Bosphorus on the e. The city proper is thus surrounded by water on all sides except the west, where is an ancient and lofty double wall four miles in length, stretching across the promontory. On the opposite side of the Golden Horn are Galata, Pera and other suburbs, while on the Asiatic side of the Bosphorus entrance is Scutari. Occupying the extreme point of the promontory on which the city stands is the Seraglio, or palace of the sultan, which, with its buildings, pavilions, gardens and groves, includes a large space (See SERAGLIO). At the principal entrance is a large and lofty gate, called Bab Humayum, *the high door* or *sublime porte*, from which has been derived the well-known diplomatic phrase. Of the 300 mosques, the most remarkable are the royal mosques, of which there are about fifteen, esteemed the finest in the world. First among these is the Mosque of Saint Sophia, the most ancient existing Christian church, converted into a mosque in 1453, on the capture of the city by the Turks (See SOPHIA, CHURCH OF SAINT). Another magnificent mosque is that of Solyman. Besides these, are those of the Sultana Valide, built by the mother of Mohammed IV, and of Sultan Achmet, the most conspicuous object in the city, when viewed from the Sea of Marmora. The streets are mostly extremely narrow, dark, dirty and ill paved and exceedingly crooked and tortuous. The numerous covered and uncovered bazars are severally allotted to particular trades and merchandise. The few manufactures are chiefly confined to articles in morocco leather, saddlery,

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tobacco pipes, fez caps, arms, perfumes and gold and silver embroideries. The foreign commerce is considerable. The harbor, the Golden Horn, which more resembles a large river than a harbor, is deep, well sheltered and capable of containing 1200 large ships, which may load and unload alongside the docks. It is about six miles long and a little more than half a mile broad at the widest part. Among the imports are corn, timber, cotton stuffs and other manufactured goods. The exports consist of silk, carpets, hides, wool, goats' hair and valonia. The suburb Galata is the principal seat of foreign commerce. Here are situated the arsenals, the dockyard and the artillery barracks, extending along the Bosphorus for nearly one and a half miles. Both Pera and Galata have now much of the appearance of modern European towns. Top Haneh is situated a little farther up the Bosphorus than Galata, of which it forms a continuation. It has a government foundry and arsenal for cannon.

Constantinople occupies the site of the ancient Byzantium, and it was named after Constantine the Great, who rebuilt it about 330 A. D. It was taken in 1204 by the Crusaders, who retained it till 1261; and it was captured by the Turks under Mohammed II in 1453—an event which completed the extinction of the Byzantine Empire. Population, including suburbs, estimated at 1,125,000.

Constellations, the groups into which astronomers have divided the fixed stars, and which have received names for convenience in description and reference. It is plain that the union of several stars into a constellation, to which the name of some animal, person or inanimate object is given, must be entirely arbitrary, since the several points (the stars) may be united in a hundred different ways, just as imagination directs. The grouping adopted by the Egyptians was accordingly modified by the Greeks, though they retained the Ram, the Bull, the Dog and others. The Greek constellations were again modified by the Romans, and again by the Arabians. At various times, also, Christianity has endeavored to supplant the pagan system, the Venerable Bede having given the names of the twelve apostles to the signs of the zodiac, and Judas Schillerius having, in 1627, applied Scripture names to all the constellations. Weigelius, a professor of Jena, even grouped the stars upon a heraldic basis, introducing the arms of all the princes of Europe among the constellations. The old constellations have, however, been for the most part retained. The

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different stars of a constellation are marked by Greek letters, α denoting those of the first magnitude, β those of the second, and so on. Stars of the sixth magnitude are the smallest visible to the naked eye. Several stars in a constellation may have also particular names. See ZODIAC; BEAR, GREAT; CASSIOPEIA; ORION.

Constitution, a body of rules by which the activities of a state are governed. It may be either a written instrument of a certain date, or an aggregation of laws and usages which have grown up in the history of the state. Constitutions are of two kinds, considered as to their place in the political system of different states: (1) those which constitute the supreme fundamental law, combining and limiting the legislative and executive departments of government; (2) those which are only ordinary law, leaving the legislative department supreme in the government. Of the former class the Constitution of the United States is the greatest example. Of the latter the constitution of Great Britain is typical. In the British system of government Parliament is supreme. Its decrees form a large part of the constitution of the Empire; but the constitution also contains or includes (1) important treaties, such as the acts of union with Scotland (1707) and Ireland (1800); (2) decrees of the executive which have been approved or given silent consent until they form a part of the administrative system of the country; (3) agreements, declarations and compacts made between the monarch and the people or Parliament, such as the Magna Charta (1215), the Declaration of Right (1689), the Act of Settlement (1701); (4) the great body of the common law; (5) many practical methods and means devised for carrying on government activities, but not having the direct legal sanction of any competent authority. The Constitution of the United States differs in one important respect from the constitutions of the states of the union. The former formed a new government of enumerated or delegated powers, the source of authority being the states. The state constitutions are but instruments placing restrictions upon the powers of government already existing. See CONSTITUTION OF THE UNITED STATES; UNITED STATES, subhead *Government*; SUPREME COURT.

Constitution, THE, the most famous vessel in the history of the American navy. She was launched October 20, 1797, but was not equipped until the following year. In the war with the Barbary powers she was Commander Preble's

flagship and took part in several bombardments of Tripoli. In July, 1812, under the command of Captain Isaac Hull, she engaged in a spirited race with a British squadron and escaped. On August 19 she fought her famous battle with the *Guerriere*, an English frigate under Captain Dacres, off Cape Race. She left the British vessel a total wreck after a contest of a half-hour. In 1828 the *Constitution* was condemned as unseaworthy and was ordered to be destroyed, but popular sentiment, aroused partly by Holmes's poem, *Old Ironsides*, compelled the abandonment of the project, and the *Constitution* was rebuilt in 1833. She was put out of commission in 1855, was again partially rebuilt in 1877 and was stored at the Boston Navy Yard in 1897.

Constitutional Law. See LAW.

Constitutional Union Party, a name assumed by a remnant of the Whig party in the South in the election of 1861. It held a convention at Baltimore, in which twenty states were represented by delegates, and nominated John Bell of Tennessee for president and Edward Everett of Massachusetts for vice-president. Its platform announced no definite principles regarding the slavery controversy, but claimed to recognize "no political principle but the Constitution of the country, the union of the states and the enforcement of laws." It received no support in the North, but carried the border states of Kentucky, Tennessee and Virginia. See POLITICAL PARTIES IN THE UNITED STATES.

Constitution of the United States, the supreme fundamental law of the United States of America, by which all powers of the national government are established and limited. The preamble declares that "We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquility, provide for the common defence, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America."

Article I gives the form of the legislative body and defines its powers, qualifications for membership and method of elections. Article II states the duties and powers of the President, the head of the executive department. Article III deals with the judiciary. These three articles provide the framework of the government machinery. Article IV guarantees certain rights of the separate states, such as a republican form of government, the

right of requisition on other states for criminals and the formation of new states. Article V determines the method of amending the Constitution, and requires the assent of three-fourths of the states. Article VI recognizes the validity of debts contracted under the Articles of Confederation, defines the Constitution as the supreme law of the land and prescribes an oath for the officers of the separate states and of the United States. Article VII states that the ratification of nine states was necessary for the establishment of the national government under this Constitution.

The Constitution has received seventeen amendments. The first ten, which correspond to the English Bill of Rights, were adopted in 1791, and establish freedom in religion, speech and press, provide trial by jury, and generally conserve the rights of individuals. The Eleventh Amendment adopted in 1798 says that the United States courts have no jurisdiction over suits brought against individual states. The Twelfth Amendment changed the method of electing the president and vice-president, and established the system now in use. The Thirteenth, Fourteenth and Fifteenth Amendments abolished slavery in the United States and declared all persons born or naturalized in the United States to be citizens, whose rights shall not be denied or abridged on account of race, color, or previous condition of servitude. The Sixteenth Amendment provides for an income tax, and the Seventeenth for the direct election of United States senators by the people; these two amendments were ratified in 1913. See INCOME TAX; UNITED STATES, subheads *Government*, *History*.

Con'sul, a name originally given to the two highest magistrates in the Republic of Rome. These officers were annually elected, at first only from the patricians, at a later period also from the plebeians. The consul was required to be at least forty-five years of age and must have passed through certain inferior offices. These laws, however, were disregarded at various times in Roman history. The insignia of the consul were a staff of ivory, with an eagle at its head, a toga bordered with purple, an ornamental chair and twelve *victors*, who, with *fascies* and axes, preceded him. At first, the consuls could declare war, conclude peace, make alliances and even order a citizen to be put to death. Though their powers were gradually curtailed, they remained the heads of the Republic—all officers were under them, the

tribunes of the people excepted; they convoked the Senate, proposed and executed the laws. In times of emergency they received unlimited power, and could even sentence to death without trial, levy troops and make war. Under the emperors the consular dignity rapidly declined and became merely honorary.

In France the name of *consul* was temporarily adopted for the chief magistrates after the Revolution. The directory having been abolished by the Revolution of the Year VIII (Nov. 9, 1799), a provisional government, consisting of Bonaparte, Sieyès and Roger Ducos, established the fourth constitution, by which France was declared a republic under a government of three elective consuls (Bonaparte, Cambacérès, Lebrun), who had almost uncontrolled executive authority. August 2, 1802, Bonaparte was proclaimed first consul for life, and on April 10, 1804, he was proclaimed emperor. Thus even the nominal consulate ended.

At present *consuls* are officials appointed by the government of one country to attend to its commercial interests in the cities of another country. The duties of a consul are to promote trade; to give advice and assistance, when called upon, to his fellow subjects; to uphold their lawful interests and privileges; to transmit reports of trade, industry and navigation to his government; to authenticate certain documents. The consular service of the United States is divided into three ranks, *consuls general*, *consuls* and *commercial agents*, the first-named having charge of all consuls in a certain district, besides performing the regular duties of consuls, and the last-named, though having the same duties and powers as consuls, being not officially recognized by the governments to which they are sent.

Consumption. See TUBERCULOSIS.

Consumption, in political economy, all use or expenditure of the products of industry or of things having an exchangeable value. It is usually characterized as productive or unproductive, according as it does or does not conduce to further production. Thus, wealth in the form of machinery is consumed productively by wear and tear in the processes of production; but the wealth expended in the maintenance of an operatic artist is, from the ordinary point of view, unproductively consumed. In the case of the operatic artist, however, it is sometimes urged that the recreative benefit conferred upon the community tends indirectly to increase

efficiency in production, and that from this point of view the artist consumes productively. So the expenditure of wealth in war, or in preparations for war, usually classed as unproductive, may be really productive consumption, as tending to the assurance of the producer in the stability of the commercial conditions. The distinction between productive and unproductive consumption, therefore, is not very definite and should be employed with caution.

Consumption is the end of all production, and as the demand of the consumer determines the employment of the various coefficients of production—land, labor and capital—it is urged by many later economists that the scientific treatment of economics should proceed from consumption to production, instead of from production to consumption. Too much stress may be laid upon this method, but the consideration of economic problems from the standpoint of the consumer is of advantage, as giving the social need, rather than the producer's profit, the prior claim upon the attention.

Contempt, an offense against the dignity, order or authority of a court or legislative assembly, usually consisting in failure to obey its specific commands, or in insults. The power of vindicating their authority against contempt is incident to all superior courts.

Con'tinen'tal Congress. See UNITED STATES, subhead *History*.

Continental System, a plan devised by Napoleon to exclude Great Britain from all intercourse with the continent of Europe. It began with the Berlin Decree of November 21, 1806, by which the British Islands were declared to be in a state of blockade; all commerce, intercourse and correspondence were prohibited; every Englishman found in France, or in a country occupied by French troops, was declared a prisoner of war; all property belonging to the English was declared fair prize, and all trade in goods from Britain or British colonies was entirely prohibited. Great Britain replied by Orders in Council, prohibiting trade with French ports and declaring all harbors of France and her allies subjected to the same restrictions as if they were closely blockaded. Further decrees on the part of France, of a still more stringent kind, declared all vessels of whatever flag, which had been searched by a British vessel or which had paid duty to Britain, denationalized, and directed the burning of all captured British goods. These decrees caused great annoyance and gave rise to much smuggling, till annulled

at the fall of Napoleon in 1814. The insistence of England on her Orders in Council was one cause of the War of 1812 with the United States (See WAR OF 1812).

Continuation Schools, a term used to describe schools intended for people already employed. Of such schools there are two more or less distinct classes—those which provide technical education for people engaged in industrial work, and those which pay more attention to the so-called cultural branches. In Germany, where schools of this type have been common for half a century, those of the former class predominate, as the compulsory laws guarantee a fair general education to everyone. In England schools of both classes are common, and attendance is very large, but results have not been entirely satisfactory.

In the United States much attention has been paid to continuation education, and in many of the cities evening schools are numerous. For the most part these classes are cultural rather than technical; indeed, it has been found that when young people have been employed all day they are too tired to profit much from work that requires any high degree of alertness. If much is to be accomplished, then, in the way of higher technical education, the work will have to be done during the day. This in its turn makes necessary the coöperation of employers. Authorities on the subject feel that compulsory laws as to continuation education will have to be passed before the work can be systematized.

Contract, in law, an agreement between two or more persons in which each party binds himself to do or forbear some act, and each acquires a right to what the other promises. Contracts may be in expressed terms or may be implied from the acts of the parties; they may be verbal or written, and at common law both forms are binding, but usually under statute law the promise must be in writing. The law of contract occupies by far the larger place in the commercial law of all nations, and there is general harmony in the principles by which it is governed.

Certain classes of persons are under peculiar disabilities as to the making of contracts: (1) In common law, contracts made by an infant (a person under twenty-one years) are voidable unless they are in some way for his special benefit or, in particular, for the necessities of life. (2) A married woman, being in the eye of the law merged in her husband, cannot bind herself by contract. (3) Contracts

made by a lunatic are voidable, except where his state of mind was not known to the other contracting party. The same principle is extended to drunkards. (4) A corporation can make binding contracts only for things or acts connected with the business for which it was especially created and chartered, excepting in cases of "convenience almost amounting to necessity" (See CORPORATION). (5) Contracts between citizens of two countries at war are illegal and void.

The making of a contract comprises two acts: first, an offer; second, an acceptance. The offer may be either in oral or written words, or by action which a reasonable person would interpret as meaning a certain definite thing. The acceptance may be either by word or by action. It must be given directly to the offerer or addressed to him and delivered to the usual carriers of communication, such as the mail or telegraph. It constitutes an assent, and the bargain is closed, if it is delivered to the carrier within a time during which it is previously agreed the offer remains open. Every contract must be founded on a consideration, either of money or of some act whereby an advantage accrues to one or both parties. Thus, the promise of a gift for no compensation whatever cannot be enforced at law. However, the law considers such a consideration as love and affection between near relatives a good consideration in certain cases. Certain considerations are held to be insufficient or illegal; among others, the promise to do an unlawful or impossible act is not binding. A contract obtained by fraud, mistake or compulsion cannot be enforced. Contracts upon certain subjects, or between certain classes of parties, must be *sealed*, that is, signed and sealed by the contracting parties (See SEAL). Certain others, known as *parole contracts*, must be reduced to writing in order to be enforced. Among these are the sale of real estate, contracts to be performed more than one year in the future, the guarantee to pay another man's debt, agreements to confer property on marriage and, in some states, the sale of goods valued at more than a certain amount.

Contracts are void when their subject matter is illegal. Such are contracts forbidden by statute (for instance, betting and gambling); those forbidden by common law (for instance, contracts to commit crime); contracts contrary to public policy (for instance, in restraint of trade; in restraint of marriage; those which

pervert the acts of government, such as bribery; those which obstruct the course of justice, and those which are immoral). Certain other contracts are voidable, that is, can be set aside, though not necessarily illegal (for instance, those obtained by mistake, fraud, misrepresentation or compulsion).

Con'al'to. See SINGING.

Con'ven'tion, NATIONAL, the name given to the assembly which met in France immediately after the dissolution of the legislative assembly in September, 1792. Among its first acts were the abolition of the kingship and the proclamation of the Republic. It adopted a radically democratic constitution, because almost from its first meeting the Jacobin element had gained the upper hand. In October, 1795, the national convention dissolved itself.

Con'vict. See PRISON.

Convict La'bor, the system in force in penitentiaries, of employing prisoners in productive enterprises, in order to keep them from idleness and to make them earn their keeping. Three general plans are in use in the United States, known, respectively, as the *lease* system, the *contract* system and the *public account* system. In the first the convicts are leased to contractors, who thereupon assume entire responsibility for their care and safe-keeping. The contract system is used in two different forms: In one the state furnishes the material and tools, the work being supervised by the contractor; in the other the contractor furnishes the tools and material, the work is supervised by state officials and the finished product is bought at a fixed price by the contractor. The chief advantages of this plan are that the state avoids risk of loss in selling the product, is not compelled to make investment and furnishes steady employment to its prisoners. The objections, however, are many. It often interferes with prison discipline, it gives the contractor an unfair advantage over his competitors, and it probably tends to reduce wages in the lines in which it is used. The public account system is gaining ground. All materials and equipment are provided by the state; the work is also supervised by the state officials and the profits are turned over to public funds. The chief objection to this scheme of convict labor is that it tends to replace the fundamental purpose of prison discipline, namely, reformation, by the ideal of financial success. See PRISON.

Convol'vulus, a genus of slender, twining herbs with milky juice, bearing bell-shaped

flowers. Some species are common weeds; others are cultivated in gardens for their beauty, and still others have strong medicinal properties. This genus gives the name to a large family of plants, many of which are of great interest. See BINDWEED; DODDER; JALAP; MORNING-GLORY; SCAMMONY; SWEET POTATO.

Con'way, HUGH. See FARGUS, FREDERICK JOHN.

Conway, MONCURE DANIEL (1832-1907), American clergyman, born in Virginia. He entered the Methodist ministry in 1858, took a course in theology at Cambridge and became a Unitarian minister, first in Washington, D. C., and later in Cincinnati. His removal from Washington to Cincinnati was made necessary by his open opposition to slavery. For many years he preached or lectured at South Place Chapel, London, and he wrote much on political, social and religious subjects in the liberal press. Among his books are *The Rejected Stone*, *The Golden Hour*, *The Wandering Jew* and *A Life of Thomas Paine*, the last of which, together with his edition of Paine's writings, is his most important work.

Conway Cabal', a conspiracy organized among a group of officers in the American colonial army in 1777, whose chief object was the undue promotion of its members, especially of General Horatio Gates to supreme command of the Continental Army. The conspiracy took its name from its most active member, Thomas Conway, and included many prominent men, among them General Charles Lee. Other more sturdy patriots, as John and Samuel Adams, though not intimately associated with the cabal, were not averse to its purposes. It accomplished much evil during its short life, but it was finally crushed, when an exposure of its dishonest methods and its unpatriotic purposes was made.

Con'well, RUSSELL HERMAN (1842-), an American author and Baptist minister, born in Massachusetts. He entered the Yale law school in 1860 and graduated in law at Albany University in 1866, meantime having served in the Federal army and won the rank of lieutenant colonel. He practiced law in Minneapolis and Boston and spent some years in Germany as immigration agent for the State of Minnesota and as correspondent for the *New York Tribune* and the *Boston Traveler*. In 1879 he entered the ministry and soon began to preach in Philadelphia, where, in 1891, he became the head of the Baptist Temple. He founded the Samaritan Hospital and also Temple College, of which he

was chosen president. He early became a popular lyceum lecturer and published several works, including *Acres of Diamonds*, and lives of Bayard Taylor, Charles H. Spurgeon, James A. Garfield and Rutherford B. Hayes.

Cook, JAMES (1728-1779), a famous British navigator. In 1755 he entered the royal navy, and four years later, as sailing master of the *Mercury*, he performed valuable services in surveying the Saint Lawrence River and the coast of Newfoundland. His observations brought him into notice, and he was appointed commander of a scientific expedition to the Pacific, with the rank of lieutenant in the navy. During this expedition he visited Tahiti and New Zealand, discovered New South Wales and returned by the Cape of Good Hope to Britain in 1771. In 1772 Captain Cook, now raised to the rank of a commander in the navy, commanded a second expedition to the Pacific and Southern oceans, which resulted, like the former, in many interesting observations and discoveries. He returned to Britain in 1774. Two years later he again set out on an expedition to ascertain the possibility of a northwest passage. On this voyage he explored the western coast of North America and rediscovered the Sandwich Islands, on one of which he was killed by the natives.

Cook, JOSEPH (1838-1901), a noted lecturer, preacher and writer, born at Ticonderoga, N. Y., and educated at Harvard and Yale universities. In 1873, after three years of preaching, he traveled through Egypt and Syria, and on his return to America he began his lectures on the relation of religion to science. They attracted wide attention and became known as the "Boston Monday Lectures." They were published in book form under the titles *Conscience, Heredity, Labor, Occident and Orient and Biology*.

Cooke, JAY (1821-1905), an American financier, born in Sandusky, Ohio. He was educated by private tutors and in 1838 became a clerk in the banking house of E. W. Clark & Co., Philadelphia. From 1842 to 1858 he was a junior member of the firm, and in 1861 he established a new firm under the name of Jay Cooke & Co. During the Civil War he performed inestimable service to the government by taking charge of many large loans, amounting in all to \$2,000,000-000. In 1873 his firm failed, because of too heavy investments in railroad stocks and bonds, and this event contributed largely to the feeling of insecurity which resulted in the panic of the same year. In later life Cooke amassed another fortune through dealing in western lands.

Cooke, JOHN ESTEN (1830-1886), an American novelist, born at Winchester, Va. He was educated for the law, but turned his attention to literature and had produced a number of works before the outbreak of the Civil War. He served in the Confederate army, and his writings after the close of the war dealt largely with his army experiences. Among his writings are the novels, *The Virginia Comedians*, *Leather Stocking and Silk*; *Life of Stonewall Jackson*, *Life of Robert E. Lee* and *Virginia: a History of the People*.

Cook'ery, the art of preparing food for the table by the use of heat. Cookery makes food more palatable and aids in its digestion. For the purpose of cooking, foods are classified into meats and vegetables, the meats including fish. Cooking meats coagulates the albumen which they contain, breaks up the muscular fiber, so that it is more easily separated and digested, and liberates juices and gases that contribute to its flavor. The general principle to be observed in cooking meats is to coagulate the albumen on the outside, so that it will not allow the juices to escape. This preserves the most nourishing part of the meat within the cut and makes the cooked part more palatable. Meats are cooked by boiling, roasting, baking, broiling, braising and frying. Unless it is desired for soup, the meat should be placed in a hot oven or over a hot fire, or in case of boiling, into very hot water, in order that the albumen on the outside may be coagulated.

The object of cooking vegetables is to break up the starch which they contain and to soften and loosen the fiber. When cooked, starch becomes much more digestible than in the raw state. Vegetables are cooked by boiling, baking or steaming. Most vegetables are best cooked by immersing them in boiling water for a short time and then completing the process at a lower temperature. Dough which contains a raising mixture, such as yeast or baking powder, is either baked or steamed, according to the article (See BREAD). Vegetables should not be overcooked, as over-cooking destroys much of their nutritive value and renders them indigestible.

Cook In'let, a bay of the North Pacific Ocean, near Sitka, extending into Alaska for about 200 miles. It affords magnificent scenery of glaciers, green fields, mountains and volcanoes, but owing to severe storms and high tides navigation is often dangerous. Captain Cook in 1778 explored the inlet, hoping to reach the Arctic Ocean.

Cook Islands or **Hervey Islands**, a group of small islands in the Pacific. Rarotonga, the largest of the group, has an area of 31 square miles, the entire area of the group being 142 square miles. The chief products are coffee, copra and oranges. In 1900 these islands were annexed to New Zealand. They were named for their discoverer, Captain Cook.

Cook Strait, the channel which separates the two principal islands of New Zealand, discovered by Captain Cook in 1770.

Cooley, THOMAS MCINTYRE (1824-1898), an American jurist and author, born at Attica, N. Y. He removed to Michigan and was admitted to the bar of that state in 1846. In 1859 he became professor, and subsequently dean of the faculty, of the law department of the University of Michigan. In 1864 he was appointed to the state supreme bench, and in 1867 he became chief justice. In 1887 he was placed at the head of the interstate commerce commission, but resigned in 1891. Cooley was recognized as high authority on constitutional law. His works include treatises on the constitutional limitations upon state legislatures, constitutional law and torts.

Coo'massie. See KUMASSI.

Coombs, *koomz*, LESLIE (1793-1881), an American soldier. In 1813 he was made captain of spies in a regiment of Kentucky volunteers. After the close of the war he became a lawyer and soon made for himself a reputation. In 1836, during the struggle of Texas with Mexico, he raised a regiment of volunteers to aid Texas. In his native state of Kentucky he served successively in various public offices, and for several terms he was elected to the legislature. When the war with Mexico began he was active in raising volunteers in Kentucky. During the Civil War General Coombs was ardently devoted to the cause of the Union.

Cooper, ASTLEY PATSON, Sir (1768-1841), an English surgeon, who was born in Norfolk. He studied medicine in London and attended the lectures of John Hunter. In 1794 he was appointed professor of anatomy at Surgeon's Hall, and in 1800 he became head surgeon of Guy's Hospital. In 1822 appeared his great work on *Dislocations and Fractures*. Shortly after, he became president of the Royal College of Surgeons.

Cooper, JAMES FENIMORE (1789-1851), the first American novelist who became well known in Europe. He was born in Burlington, N. J., and studied at Yale, but he was not a close

student and was expelled from college in his third year. Other things besides books he knew well, and his intimate acquaintance with the forests and his knowledge of the sea, gained while serving in the United States navy, furnished him later with the materials for his novels. After his retirement from the navy just before the War of 1812, he settled at Cooperstown, N. Y., and took to farming. Having boasted to his wife that he could write a better novel than many of the romantic ones which were appearing in his time, he produced *Precaution*, a tale which was commonplace, because it dealt with phases of English high life with which Cooper was totally unacquainted. When in



JAMES FENIMORE COOPER

1821 he turned to tales of adventure in his own country and wrote *The Spy*. he was recognized at once as a novelist of force. In the twenty years that followed he brought out many novels, chief among them *The Pilot* and *The Red Rover*, sea tales, and the *Leather Stocking Tales*, his great series dealing with frontier life in America. This series includes *Deerslayer*, *The Last of the Mohicans*, *The Pathfinder*, *The Pioneer* and *The Prairie*, of which *The Last of the Mohicans* is the best. These novels won for Cooper the title of the American Scott, but this comparison of Cooper with Scott rather lessens the fame of the American novelist by setting too high a standard for the judging of his works.

After spending seven years in Europe, Cooper returned to the United States and settled in his own home. The superior culture of Europe had made him look with displeasure on the ruggedness of his own country, and he attempted, by articles published in various papers, to explain to his fellow countrymen what he thought they ought to be. The result was, of course, bitter censure, and Cooper, unable to accept criticism, brought numerous lawsuits against those who attacked him. This course brought down upon him much ridicule at home and abroad.

Cooper's writings were immensely popular in their own day and are still very widely read. They were the first novels of forest and prairie life, and while they have many faults, his vivid description and stirring narrative account readily for the enthusiasm with which they were received. It has been objected that his indians are idealized, and that his characters are not real, but Cooper probably knew his indians much better than those who criticised him, and it must be admitted that in *Natty Bumppo* and *Long Tom Coffin* he has created characters which are worthy of a lasting place among the characters of fiction.

Cooper, PETER (1791-1883), an American inventor, manufacturer and philanthropist, born in New York City. In 1808 he was apprenticed to a carriage maker, and while with him he invented a machine for mortising the hubs of carriages, which proved of great value to his employer. Later, Cooper undertook the trade of cabinetmaking, the grocery business and the manufacture of glue. In connection with the latter he made oil, prepared chalk, whiting and isinglass and became very wealthy. In 1828 he bought 3000 acres of land in Baltimore and erected the Canton iron works. In 1830 he constructed from his own designs the first locomotive engine ever made in this country, the *Tom Thumb*. Soon after this he sold his iron works in Baltimore and, returning to New York, built an iron factory, which he afterward turned into a rolling mill, making the first rolled iron beams for construction purposes. In 1845 he removed his works to Trenton, N. J., and built three blast furnaces, the largest then known, bought the Andover iron mines and built a railroad through the eight miles of country to bring the ore to his furnaces. He was a liberal promoter of the Atlantic cable and was president of the New York, Newfoundland and London Telegraph Company. In 1853 he founded Cooper Union for the advancement of science

and art and erected a fine building for its purposes (See COOPER UNION). During the financial agitation following the crisis of 1873 he was active in the Greenback movement, and in 1876 he was the candidate of an independent party for president.

Cooperage, *koop'ur aj*, the art of making vessels from pieces of wood bound together by hoops. Barrels, casks, tubs, firkins and pails are good illustrations of vessels made by cooperage. The parts of a cask are the staves, the hoops and the heads. The staves are widest in the middle and gradually taper toward the ends. This shape produces the bulge in the cask. When vessels are required which do not have the bulge, the staves are straight. If they are the same width throughout, the vessel is a cylinder. If they are wider at one end, the vessel flares, being larger either at the top or bottom. Formerly all cooperage was done by hand, the cooper carefully shaping the staves and giving the edges the proper slant to fit them together in the vessel, but now the work is done entirely by machinery. The staves are cut by a saw in the form of a cylinder, having teeth upon one end. They are then cut to the proper length by circular saws and placed upon an edging machine, which gives them the desired finish. The heads are made by matching the boards and fastening them together with pins and glue. When the glue is dry the boards are placed upon a turntable, where they come in contact with a circular saw which cuts them into the desired shape and also trims the edges so that they will fit into the casks. See BARREL.

Coöper'ation, a term in social economics, which, though of general significance in the science of industry and trade, has a specific and technical sense, which is, the association of any number of individuals or societies for mutual profit, whether in the purchase and distribution of commodities for consumption, or in the production of commodities, or in the borrowing and lending of capital among workmen.

The most powerful coöperative force in the industrial system is what economists have termed "the division of labor," and this has its counterpart in the multiform divisions of capital in its application to the maintenance and extension of industry.

Coöperation, as technically understood, occupies a middle position between the doctrines of the communists and socialists on the one hand, and private property and freedom of individual labor and enterprise on the other. -It takes its

Cooper's Creek

departure from ~~communion~~ at a very definite and significant point. While the latter would extinguish the motive of individual gain and possession in the sentiment of a universal happiness or good and remodel all existing rights, laws and arrangements of society to this end, coöperation seeks to ameliorate the social condition by joining together increasing numbers of associates in a common but individual interest.

The coöperative societies, though attended with the most varied fortune, have greatly increased in number and in amount of business in recent years. The form, objects and rules of these associations are by no means uniform. But the organizations may be divided into three general classes: (1) *societies of consumption*, the object of which is to buy and sell to members alone, or to members and non-members under differing conditions, the necessities of life or the raw materials of their industry; (2) *societies of production*, the object of which is to sell the collective or individual work of the members; (3) *societies of credit or banking*, the object of which is to open accounts of credit with their members and advance them loans for industrial purposes. These societies have taken many forms, such as friendly societies, burial societies, arrangements of private firms by which the workmen share in the profits of the employers (more accurately known as *profit-sharing*), and building societies, the object of which is to enable members to become owners of dwelling houses. In recent years numerous coöperative stores and banks have been established in the United States, most of which have so far prospered.

Cooper's Creek, in Australia, is formed by the Thomson and Victoria rivers in Queensland and flows southwest into Lake Eyre. In summer its lower course is dry, but during the rainy season it is two miles wide.

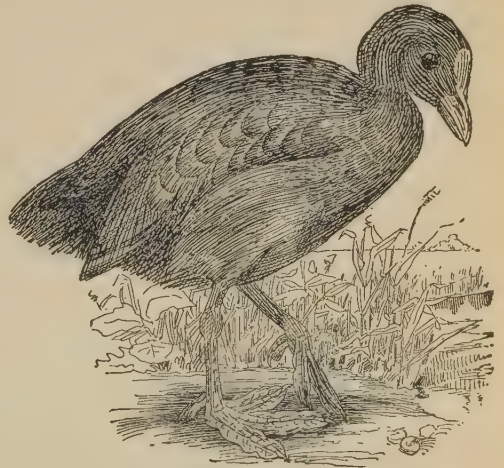
Cooper Union, an educational institution established in New York City in 1859 by Peter Cooper, for providing for the working classes free instruction in applied science, art and social and political science. The building, situated at the point where the Bowery divides into Third and Fourth Avenues, was erected by Mr. Cooper and deeded to the board of trustees. Its cost was \$630,000. Since its establishment, the institution has received bequests from a number of Mr. Cooper's colleagues, and in 1900 an additional gift of \$600,000 from Andrew Carnegie, so that it now has an endowment of over \$2,000,000, with a total property valuation of \$3,200,000, and an annual income of about

Coot

\$100,000. As organized, the Union provides for both day and evening classes and affords the working people of New York a means for becoming proficient in applied sciences and technical trades; it also gives them an opportunity to study art, economics, sociology and kindred subjects. Lectures, reading rooms and scientific and art collections are maintained and are open to all patrons of the institution. The average enrollment is about 3000.

Coor'dinates, in geometry, a term applied to magnitudes, such as lines, points and angles, by reference to which the position of a point under consideration is determined and expressed. When the position of a point is determined by references to a certain point, called the pole, and a line passing through the pole, by means of a distance and an angle, this distance and this angle are called *polar coordinates*. When the location is by reference to two perpendicular lines, the distances of a point from these two lines are called the *rectilinear* or *cartesian coordinates*. When the two lines of reference are not perpendicular, the distances of the point from these lines are called *oblique coordinates*. See ANALYTICAL GEOMETRY.

Coosa River, a river formed by the junction of the Etowah and the Oostenaula at Rome, Ga.



COOT

Its course is westward into Alabama and then southward. It unites with the Tallapoosa to form the Alabama. Its length is about 350 miles, and it is navigable for small steamers for a part of its course.

Coot or **Mud Hen**, a bird of the rail family, that lives near and on the water, fleeing to the

Copaiba

weeds and grasses when alarmed. The common coat of the United States is a dark slate color, almost black on the head and neck. The toes are not webbed, but have white scalloped bands, which nearly meet. The bill is a dull white.

Copaiba, *ko pa'bah*, or **Copaiva**, *ko pa'vah*, a balsam obtained from incisions made in the stems of plants growing in Brazil and Peru. It consists of several resins dissolved in a volatile oil. The resins are partly acid and partly neutral; the oil is clear, colorless and has an aromatic odor.

Co'pal is a gum resin, yielded by different trees in Africa, South America, India and Australia, and differing considerably in its qualities, according to its origin. In general it is hard, shining, transparent and citron-colored. When dissolved in alcohol or turpentine it makes a beautiful and very durable varnish.

Cope, **EDWARD DRINKER** (1840-1897), an American scientist. He graduated from the University of Pennsylvania and studied comparative anatomy in the Academy of Science, Philadelphia, in the Smithsonian Institution, Washington, D. C., and in Europe. He was appointed professor of natural science in Haverford College in 1866, and afterward he accepted that professorship in the University of Pennsylvania. He was a member of the Geological Society of France and of the American Association for the Advancement of Science.

Co'penha'gen, (merchants' harbor), the capital and largest city of Denmark, situated on the islands of Amager and Zealand, the strait separating the two forming an excellent harbor. The city is handsomely laid out with gardens and fine buildings. It is the seat of the government and the residence of the king. Among the principal buildings are the Church of Our Lady; Holmens Kirke, dating from the seventeenth century; the Church of Our Redeemer; the Roseburg Palace; the Exchange, dating from the seventeenth century; the Glyptothek, containing a very choice collection of sculpture; the new art museum; the royal library, containing 500,000 volumes; the National Museum, and the Thorwaldsen Museum, containing Thorwaldsen's grave and a fine collection of his works of art, which he bequeathed to Copenhagen. Copenhagen also contains a university, the only one in Denmark and the oldest one in northern Europe, founded in 1478 and containing a library of 300,000 volumes. The city is the chief center of Scandinavian literature, science and

Copley

art. Shipbuilding is extensively carried on here, and there are machine shops, sugar refineries, chemical works and textile factories. The commerce is very important, and more than one-half of Denmark's trade passes through Copenhagen. King Christopher, the Bavarian, in 1443 made Copenhagen the capital of the kingdom. It has withstood several sieges, among which was the one by King Charles X of Sweden (1658-1660), when Copenhagen saved the Danish monarchy, and the one by the English in 1807, when a part of the city was destroyed. Population in 1911, 462,161.

Copernicus, *ko pur'ni kus*, **NICHOLAS** (1473-1543), a famous astronomer, born at Thorn, Poland. Having studied medicine at Cracow, he afterward devoted himself to mathematics and astronomy, and in 1500 he taught mathematics at Rome with great success. Returning to his own country, he entered into holy orders, was made a canon in the Cathedral of Frauenburg and began to work out his new system of astronomy. Doubting that the motions of the heavenly bodies could be so confused and so complicated as the Ptolemaic system made them, he was induced to consider the simpler hypothesis that the sun was the center round which the earth and the other planets revolve. Besides this fundamental truth, Copernicus anticipated, for he can scarcely be said to have proved, many other of the principal facts of astronomical science, such as the motion of the earth round its axis and the immense distance of the stars, which made their apparent position the same from any part of the earth's orbit. The great work in which Copernicus explained his theory was completed in 1530, and on account of it he was excommunicated by the pope, who did not consider his views to be in harmony with the Scriptures.

Copiapo, *ko pyah po'*, a city of Chile, South America, capital of the province of Atacama, 50 mi. from Caldera. Its importance is due to its position, which is in the center of a valuable mining district. It has a public library, a mining school, machine shops and smelting works. Population, 9301.

Cop'ley, **JOHN SINGLETON** (1737-1815), an American painter of historical subjects and of portraits, born in Boston, Mass. He traveled extensively in Europe, and after 1776 he settled in London. He was elected a member of the Royal Academy in 1783. His most celebrated picture is the *Death of Lord Chatham*, now in the National Gallery.

Copper

Cop'per, a reddish metal about nine times heavier than water. Copper is one of the most ancient of the known metals and derives its name from the Latin word *cuprium*, the name for Cyprus; the island on which the copper used by the Greeks and Romans was obtained. Next to gold, silver and platinum, copper is the most ductile and malleable of metals. It is more elastic than any other metal except steel, and the most sonorous of all except aluminum. As a conductor of heat and electricity it ranks next to silver. It has a disagreeable odor, and a nauseous metallic taste. It is not acted upon by water, but tarnishes when exposed to the air, becoming covered with a green carbonate.

DISTRIBUTION. Copper occurs native in crystals, threads and thin plates. In some of the older rocks, blocks of native copper weighing several tons have occasionally been obtained. The ores are numerous and abundant. The most important of these are compounds of copper with silver, oxygen, carbon or iron, such as copper glance, gray copper and copper *pyrites*, or yellow copper. Nearly all of these ores also contain more or less lead and silver, and in their reduction these metals are obtained as well as the copper.

Copper is found in nearly all of the European countries, in Japan, Africa, Australia and South America; but the United States is the leading country in its production and yields about two-thirds of the world's supply. The leading copper regions of the United States in the order of their importance are, in and around Butte and Anaconda in Montana, in Arizona, and in Keweenaw Peninsula in Michigan. These three regions produce nine-tenths of the output of the country. The copper found in the Lake Superior mines is native and occurs in a conglomerate rock, but that obtained in the other mines is from an ore, either sulphide or carbonate.

REDUCTION OF THE ORE. In extracting copper from the rock at the Lake Superior mines, all that is necessary is to crush the rock and separate the copper from it by washing. This is then melted. The process of separating it from ore containing sulphur is somewhat complicated. The ore is first crushed, then concentrated, that is, caused to pass over a number of tables which have a vibratory motion and over which water is flowing. By this process the particles of rock not containing ore are separated out and rejected. The concentrated ore thus obtained is heated to redness, or roasted, for the purpose of driving off the sulphur. The ore is

Copperhead

then smelted and an impure copper is obtained. This is usually sent to the eastern markets, where it is refined. Some of the ores are successfully treated by electrolysis (See **ELECTROLYSIS**), the use of a powerful electric current being employed instead of heat for extracting the metal.

USES. Copper is extensively used in connection with electrical appliances, especially for wires to conduct the current along electric railways, and for the main conductors of telegraphs and telephone systems. This use consumes more than half of the product. The other extensive uses are for sheathing ships, covering roofs, the construction of stills and boilers of large size and in the manufacture of some household utensils. Another portion is consumed in the manufacture of alloys, such as brass, bell metal and gun metal. See **BRONZE**.

There are a number of compounds of copper, and all of them are exceedingly poisonous. Native carbonates, known as *malachite*, form beautiful cabinet specimens, since they are of a brilliant green or blue color. Some of the largest pieces of this rock are sometimes cut and polished for mantels and table tops, and quite a good deal of it is used in the manufacture of small ornaments, such as paper weights and inkstands.

Cop'peras, sulphate of iron or green vitriol, a salt of a peculiar puckery taste and of a fine green color. When exposed to the air it assumes a brownish hue. It is much used in dyeing black and in making ink, and in medicine as a tonic. The copperas of commerce is usually made by the decomposition of iron pyrites.

Copper Glance, a copper ore of a leadish or iron gray color. It contains 81 parts copper and 19 parts sulphur, and is found in large quantities in Cornwall, England, and other European countries. In the United States it occurs in the copper mines of the Lake Superior region and in the mines of New Mexico and Arizona, near the Gila River, and also in small quantities in New Jersey and Connecticut. When occurring in crystals it forms beautiful cabinet specimens.

Cop'perhead, a North American snake of a golden or bronze color, that has a bright copper-colored head. On the body are V-shaped dark blotches which meet upon the back. The copperhead is a sluggish snake, appearing usually only at night, and it is not inclined to bite unless frightened or disturbed. It is one of the three poisonous snakes of the Northern states and has many names in different localities; among them are cottonmouth, moccasin and red adder.

Copperhead, a name applied by Union men during the Civil War to those Northerners who sympathized with the South in that struggle.

Cop'permine River, a river of northern Canada, near Copperhead Mountains. It rises in Point Lake and flows into Coronation Gulf in the Arctic Ocean. This river is about three hundred miles long and contains a great number of waterfalls and torrents, which render it useless for travel.

Cop'per-nick'el or **Niccolite**, *nik'o lite*, an ore of nickel, composed of about sixty parts nickel and forty parts arsenic. It is of pale copper red and has a metallic luster. It is found with ores of cobalt, silver and copper in the mines of Saxony.

Copts, a class of people, resident in Egypt, who observe a rude form of the Christian religion and who are supposed to be a relic of the old Egyptian race who built the monuments. By association with the Moslems they have acquired many Moslem customs and are losing their distinctness as a people. The men wear a black or brown turban and a long gown, with sometimes a black coat or jacket over it. The women veil their faces in public.

Cop'ying Devices, devices for duplicating letters and manuscripts without rewriting them. One of the oldest processes of duplicating letters and manuscripts is the letterpress, which usually consists of a book containing leaves of tissue paper and a press. The instrument to be copied is written in copying ink, either with a pen or upon the typewriter; this ink contains sugar or some other substance that prevents its drying rapidly. After writing, an oil-back is placed under the leaf in the book. The leaf is then dampened and the article to be copied is laid face down upon it, with another oil-back to protect the book from the moisture. The copying book is then placed in a press which works with a lever or screw, and when the pressure is applied the writing is transferred to the dampened page of the book. Webs of paper which are passed between rollers to which damp cloths are attached are also used in place of the book in this form of copying.

The most common method of copying now in use in offices is the use of the carbon paper with the typewriter. This paper has one side covered with a coloring matter which, when struck with the die of the typewriter or pressed with a pencil, is transferred to the surface of the sheet lying next to it. In copying, the carbon is laid next

to the sheet upon which the writing is produced, with its colored surface lying upon another sheet of paper, and as the writing proceeds either with pencil or typewriter, the ink from the carbon is impressed upon the second sheet of paper. By employing two or three carbons, as many copies can be made from one writing.

Devices for producing a larger number of copies from writing are the hektograph and the mimeograph. The hektograph consists of a pad or tablet, made by mixing gelatin and glycerin in proportions of two ounces of gelatin to thirteen ounces of glycerin. The gelatin should be dissolved in water and the glycerin heated before mixing. The mixture should then be boiled for several hours over a salt water bath, then poured into a shallow pan. The ink used is usually an aniline ink containing a small proportion of glycerin. The copy is written upon ordinary paper, which is then laid face down upon the hektograph and carefully rubbed with the hand or a cloth, when the ink is transferred to the surface of the hektograph. The copy is then removed and as paper is pressed down upon the hektograph, a slight portion of the ink adheres to it so as to reproduce the writing. By using care, from fifty to one hundred copies can be made from a single writing.

The mimeograph, invented by Thomas A. Edison, works on the principle of the printing press. It consists of a corrugated steel plate which resembles a very fine file, and a specially prepared linen paper which is coated on one side with paraffin wax. By writing on the paper with a stylus, over the steel plate, the wax is cut through, forming a stencil. The stencil is then placed in a frame and so adjusted that the paper upon which the impressions are to be made is easily placed under it and removed. The ink is applied by a roller similar to that used in the hand printing press. As the roller moves over the paraffin paper, the ink passes through the stencil, reproducing the writing on the paper beneath. From such a stencil from one hundred to three hundred copies can be made. A recent modification of this mimeograph consists of a rotary apparatus, working very much on the plan of a cylinder printing press. The stencil is made on the paraffin paper by the typewriter. This is then attached to the cylinder and inked upon the inner side. As the cylinder revolves, the stencil is brought in contact with the paper upon which the copy is printed. By one of these devices several hundred copies can be made from one stencil. See **BLUE PRINT**.

Copy'right, the property which an author has in his literary works, or which any other person has acquired by purchase, and which consists of the exclusive right of publication; or the right which a designer, engraver, painter, draughtsman, photographer or sculptor has in his original products. The copyright law of the United States gives the copyright of a work exclusively to the author for twenty-eight years, with renewal for twenty-eight years more. In the case of encyclopedias, reviews, magazines and other periodical works, the copyright is vested in the proprietors, as if they were the authors. To obtain a copyright send to the Register of Copyrights, Library of Congress, Washington, D. C., for an application blank. Fill out this blank and return it with a postal money order or bank draft for \$1.00, and at the same time send two copies of the best edition of the publication which is to bear the copyright imprint, which should appear on the title page, or the page following. Other details can be obtained from the Register. Dramatic and musical compositions are subject to the same copyright as books. The exclusive right of performing such compositions not printed, or of causing them to be performed, belongs to the author. Lectures and public speeches are the property of the author and cannot be published without his consent, unless they are delivered under a public endowment, or under contrary agreement. Letters are the property of the receiver, but he has not the right to publish them without the writer's consent. Any person copying or taking extracts from a copyright work is liable for damages, and all copies of pirated works become the property of the proprietor of the copyright. In European countries copyright is generally for the author's life, and a varying period thereafter—twenty, thirty or even fifty years. An author domiciled in Canada, or in any part of the British possessions, or a citizen of a State having an international copyright treaty with Great Britain, may secure copyright in Canada for twenty-eight years and renewal of it for fourteen years, provided the work is published in Canada.

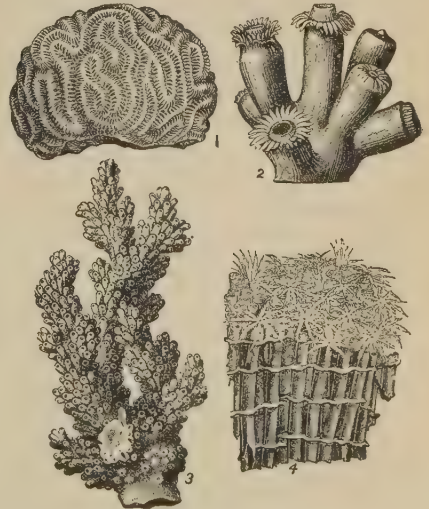
A copyright may exist in a translation or in part of a work (as in notes or additional matter), but a *bona fide* abridgement of a book is not considered in America and England a violation of the original copyright. So a person may use fair quotation, if by its application he makes it a part of his own work, but he cannot take the whole or a large part of a work under the pretense of quotation.

International copyright is a mutual agreement between nations as to copyright. In March, 1891, Congress passed an International Copyright act. Under it agreements have been made with most countries by which works may be copyrighted therein, under special rules. A work to be copyrighted in the United States must be printed from type set in the United States.

Coquelin, *ko klaN'*, BENOIT CONSTANT (1841–1909), a noted French actor. His dramatic talent became evident early, and he was given a course in the Paris Conservatoire. His presentations of *The Marriage of Figaro*, *The Misanthrope* and *The Barber of Seville* met with great success and won him wide popularity. In the several visits which he made to the United States, some of them with Sarah Bernhardt, he was most enthusiastically received, especially in *Cyrano de Bergerac*.

Coquimbo, *ko keem'bo*, a town of Chile, South America, capital of a province of the same name, situated 7 mi. s. w. of La Serena. It has an excellent harbor and an important trade in copper. The mountainous region in the neighborhood is rich in copper, silver, gold and other metals. Population in 1910, estimated, 15,700.

Coquito, *ko ke'to*, a very beautiful palm of Chile, allied to the coconut, growing to the



CORALS

1, brain coral; 2, coral showing polyps; 3, tree coral
4, organ-pipe coral.

height of 40 or 50 feet, yielding a rich, sweet sap, which, when boiled, is called palm honey.

Cor'al, the limestone skeleton formed by minute animals belonging to a family closely

resembling sea anemones (See COELENTERATA). The animal, which is really a *polyp*, is commonly known as the coral insect. It consists of a jelly-like mass, in the center of which is a sac which serves as a stomach, and radiating from this are minute arms, which assist the polyp in clinging to the rock and in drawing food into the stomach. There are numerous species of coral polyps, each of which builds a coral peculiar to itself. *Tree* coral, which is so named because it resembles the branches of a tree, is formed by a polyp that propagates by buds, which spring from its sides in such a way as to constitute the branches. Another species forms a coral resembling bundles of straw fastened together, and known as the *organ-pipe* coral. Still another forms a coral resembling in its shape and convolutions the human brain. This is known as the *brain* coral. The most common and widely distributed polyp is that which forms the *reef* coral.

In color corals range from pure white through yellow, pink and red, to black. The pink, red and black varieties are quite highly prized for jewelry and other ornamental purposes. The pink and red are found in the Mediterranean, and because of their value coral fisheries are maintained off the coasts of southern Europe and of northern Africa. These branching corals are procured by a grappling apparatus which is dragged over the bottom of the sea and breaks off the coral and holds it until it can be drawn to the surface. These corals take a high polish and are wrought into jewelry, necklaces and other ornaments, the chief centers of the industry being Naples and Genoa. In value they vary according to their color and fineness, the most beautiful specimens bringing a high price.

Coral reefs are found in nearly all tropical waters, and in some localities, as off the coast of Australia, they are of great extent. The reef-building coral will not live in water that falls below a temperature of 60°. It begins building upon the bottom of the sea and each generation builds upon the skeleton formed by the one preceding it, so that in the course of centuries these little animals have built up great barriers that rise above the surface of the water. The reef as built by the coral polyp, however, does not approach within five or six feet of the surface, as the animals cannot live above that level. The upper portions of the reef are built up from broken pieces of coral or other rock lodged upon the original reef by the action of the waves. These finally reach the surface; soil is formed

by the powdering of the coral; in this earth seeds lodge and plants spring up. Reefs thus built around the coast of submerged volcanoes take a circular form and enclose a lagoon of quiet water (See ATOLL). The study of the various rock formations of the earth shows that the coral polyps have been working for many ages.

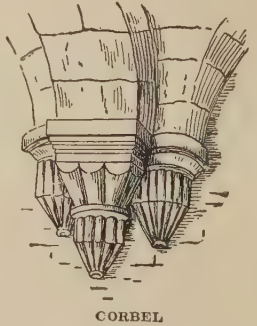
Coral Fish, a name given to several fishes of different genera. They are found in all tropical seas, especially about coral reefs, and are all brilliantly colored. They are very small and are valuable as food. Many species are found in the waters from Bermuda to Brazil, where several are known as angel fishes.

Coral Sea, part of the Pacific Ocean, north-east of Australia, and lying between that continent and the Solomon Islands and the New Hebrides. It takes its name from the numerous coral reefs it contains.

Coral Tree, a tree or shrub belonging to the pea family, a native of Africa, India and America. It bears spikes of bright scarlet flowers, and the spiny Indian species makes a good hedge.

Cor'bel, in architecture, a piece of stone, wood or iron projecting from the vertical face of a wall, to support some part of the building. Corbels are of a great variety of forms and are ornamented in many ways. They were used especially in Gothic architecture. See BRACKET; CONSOLE.

Corbie, *kor'be*, **Steps**, in architecture, steps into which the sides or gables from



the eaves to the apex are broken. They are common in old Scotch and French architecture and are met with in Flanders, Holland and Germany, both in houses and churches.

Cor'bin, HENRY CLARK (1842-1909), an American soldier, born in Clermont co., Ohio. He studied law, entered the Union army in 1862 and was promoted from second lieutenant to colonel and brevetted brigadier general of volunteers. He entered the regular army in May, 1866, and served on the frontier. In 1880 he was appointed major and assistant adjutant general of the United States army and served continuously in that department for nearly twenty-five years, being promoted to the grade of brigadier general. In recognition of his serv-

ices, especially in the war with Spain, Congress made him a major general. After 1904 he was placed in command of the Atlantic division, and then of the Philippine division, of the army.

Cor'coran, WILLIAM WILSON (1798-1888), an American banker and philanthropist, born in Georgetown, D. C. In 1828 he had charge of the real estate held by the United States Bank in the District of Columbia, and continued as their agent until 1836. It was in 1837 that he began his career as banker and broker in Washington, and during the Mexican War, by his connection with the placing of government loans, he acquired an immense fortune. In 1854 he retired from the banking business and gave much of his time to objects of benevolence, his principal monument being the Corcoran Art Gallery, Washington, containing some of the finest sculptures and paintings in America.

Corcoran Art Gallery, a famous collection of works of art in Washington, D. C., founded and endowed with a fund of \$900,000 by William W. Corcoran, a wealthy banker of Washington. There are many remarkable sculptures, paintings and ceramics in the collection, besides a school of art. Among the works of great merit are Powers's *Greek Slave* and Velas's *Dying Napoleon*. The collection is housed in a beautiful building, completed in 1897.

Cordage, *kor'daj*, the term used to include all sizes of cords from binding twine to the largest cable. See BINDING TWINE; ROPE.

Corday d'Armont, *kor da' dahr mahN'*, MARIE ANNE CHARLOTTE (1768-1793), commonly called Charlotte Corday, was born in Normandy. Her lover, an officer in the garrison of Caen, was accused by Marat as a conspirator against the Republic and was assassinated by villains hired for that purpose. This, as well as a deep-rooted hatred against all oppressors, determined Charlotte Corday to free her country from Marat. Having obtained an interview with Marat at his own house, she plunged her dagger into his bosom and gave herself up to the attendants who rushed in at his cries. When tried for the murder before the revolutionary tribunals, she was condemned to the guillotine and executed.

Cordil'lera or **Cordil'leras**, a term applied to the mountain system which extends along the western coast of North and South America from Alaska to the southern point of South America. It includes the Rocky Mountains, the Sierra Nevadas and other ranges in the United States, several ranges in Mexico, Canada and Alaska,

and the Andes in South America. The term is sometimes used in a more general way to denote any extensive mountain system. See ROCKY MOUNTAINS; ANDES; SIERRA NEVADAS.

Cor'doba or **Cor'dova**, a town of the Argentine Republic, capital of a province of the same name. It occupies a beautiful and well-sheltered site in the valley of the Primero, at an elevation of 1200 feet. Among the notable buildings are the cathedral, the government palace, the university, the library and several hospitals. The city is an important commercial center, and the industrial interests are considerable. Among the manufactures are lime, bricks and flour. Population in 1911, 70,380.

Cordova, an ancient Spanish city on the Guadalquivir, 86 mi. n. e. of Seville. The river at Cordova is crossed by an old stone bridge, 730 feet long and including sixteen arches, built by the Arabs on foundations laid by the Romans. Cordova is well supplied with beautiful buildings, the chief one of which is a mosque erected in the eighth century. This is a fine example of Moorish architecture and is second only to the mosque of Mecca as a Mohammedan place of worship. In the interior are 850 columns made of marble, jasper and porphyry. Cordova carries on a considerable trade. Among the manufactures are leather, paper, liquors, hats and silver filigree work. Cordovan leather, made from goatskins, was at one time manufactured exclusively here and was exported to all parts of Europe during the Middle Ages. The Romans had possession of the city in 152 B. C. It was taken by the Saracens in 711, and in the ninth, tenth and eleventh centuries it ranked among the first commercial cities of the world, at this time, it is said, having a population of one million. After it was taken by Ferdinand III of Castile in 1236, it never regained its power. Cordova is the birthplace of the two Senecas and of the Roman poet Lucan. Population in 1910, 65,160.

Cor'dovan, a kind of leather, manufactured originally at Cordova, whence its name. Much is now made in Africa and surrounding countries. It is also called *cordwain*.

Cor'duroy, a thick, cotton stuff, having a cut pile like velvet, but corded or ribbed on the surface. A *corduroy road* in the United States is a rough road over swampy or marshy places, made by laying logs side by side.

Core'a. See KOREA.

Corel'li, ARCANGELO (1653-1713), an Italian violinist, born near Bologna. By his sonatas

and concertos for the violin he established a new species of harmony, and by his marvelous performance he laid the foundation of modern violin technique. He is sometimes called "Corelli the Divine."

Corelli, MARIE (1864-), an English novelist. She was born in Italy and was educated in England and France. Charles Mackay adopted her as his daughter in her childhood. Her first work, *The Romance of Two Worlds*, appeared in 1886. Among her other most widely known novels are *Thelma*, *Barabbas*, *The Sorrows of Satan* and *The Master Christian*.

Corentyn, *ko ren teen'*, a river of South America, forming the boundary between British and Dutch Guiana. It is navigable for small vessels 150 miles from its mouth, but for large steamers only 40 miles.

Corfu (Roman Corcyra), a Greek island in the Mediterranean, the most northerly of the Ionian Islands. The area is 277 square miles, the length, 38 miles, and the width, from 3 to 20 miles. The surface rises at one point to the height of 3000 feet. The scenery is beautiful, the climate is pleasant and healthful, the soil, fertile. Oranges, citrons, grapes, honey, wax, oil and salt are abundant. Corfu, the capital, is finely situated on a promontory which terminates in a huge insulated rock, crowned by the citadel. The chief edifices are the cathedral, the government palace and the Ionian academy. There is a good harbor and considerable trade. A Corinthian colony settled in the island in the eighth century B. C. In 229 B. C. it became subject to Rome and at the division of the Roman Empire it became a part of the Byzantine realm. The Venetians possessed Corfu from 1386 to 1797, since which time it has shared the fate of the other Ionian Islands and has belonged, with them, since 1863, to Greece. Population in 1907, 99,571.

Corian'der, a plant of the parsley family, native of Italy and cultivated in other parts of Europe. The whole plant has an unpleasant smell, but the fruit, improperly called seed, is very agreeable and aromatic when dry. It is used in medicine and as an ingredient in cookery and confectionery.

Corinth, an ancient city of Greece, upon the isthmus of Corinth, which unites the Peloponnesus with northern Greece. It was a renowned city in ancient Greece and was important commercially because of its advantageous position. It possessed all the splendor which wealth and luxury could create, and its citadel, the Acrocor-

inthus, nearly 2000 feet high, rendered it a strong fortress. It had two harbors, Lechaëum, on the west side of the isthmus, and Cenchreæ, on the Gulf of Athens, or Aëgina. Corinth was famous as the place where the Isthmian games were held. It was also one of the most magnificent and one of the most voluptuous cities of Greece. It was conquered and destroyed by the Roman consul, Mummius, in 146 B. C. Julius Caesar rebuilt it about one hundred years later, but its commerce could not be restored, though it became a place of note and importance. In 1458 A. D. Mohammed II conquered Corinth, and it was held by the Turks till 1823, except from 1687 to 1715, when the Phœnicians held it. Saint Paul lived here a year and a half, and two of his epistles are addressed to the Corinthians. The present town, called New Corinth, lies 3 miles northeast of the ancient city of Corinth. Population in 1907, 4100.

Corinth, Miss., a city, the county-seat of Alcorn co., 90 mi. s. e. of Memphis, Tenn., on the Mobile & Ohio and the Memphis & Charleston railroads. Population in 1910, 5020. The place had an interesting history in the Civil War. It was a point of strategic importance, since it was the junction of two railroads at right angles to each other. It was fortified by the Confederates, but was evacuated after the Battle of Shiloh, May 29, 1862. On October 3 of the same year, Generals Van Dorn and Price with 22,000 Confederates attempted to recapture Corinth, defended by Rosecrans with 20,000 Federals. In spite of the greatest valor on the part of the Confederate troops, the attack was repulsed. The Confederates lost nearly 5000 in killed, wounded and captured, while the Union forces lost about 2500.

Corinth, GULF OF, or Lepanto, GULF OF, extends through the center of Greece about 80 miles. Its shores, varied by rocky capes and fertile plains, and its high mountains further inland, furnish beautiful scenery.

Corinth, ISTHMUS OF, connects the Peloponnesus with northern Greece. It is about 10 miles long and varies in width from four to eight miles. Here, where the wall built to protect it from northern invasions terminated on the gulf, the Isthmian Games were celebrated. A canal across the isthmus, completed in 1893, connecting the Gulf of Corinth with the Saronic Gulf, enables the largest vessels to pass through. At the eastern end of the canal is the town of Isthmia, at its western, Poseidonia.

Corinthian Order. See COLUMN.

Cork is the external bark of a species of oak which grows in Spain, Portugal and other parts of southern Europe and in the north of Africa. The outer bark falls off of itself if left alone, but for commercial purposes it is stripped off when judged sufficiently matured, this being when the tree has reached the age of from fifteen to thirty years. The first stripping yields the coarsest kind of cork. In the course of eight or nine years or even less the same tree will yield another supply of bark of better quality, and the removal of this outer bark is said to be beneficial, the trees thus stripped reaching the age of one hundred and fifty years or more. The bark is removed by a kind of ax, parallel circles, being cut round the tree and united by longitudinal cuts, so as to produce oblong sheets of bark. These vary in thickness between three-fourths of an inch and three inches. Care must be taken not to cut into the inner bark or the tree will be killed. The pieces of cork are flattened out by heat or by weights and are slightly charred on the surface to close the pores. Cork is light, elastic, impervious to water, and by pressure can be greatly reduced in bulk, returning again to its original size.



CUTTING CORK FROM TREE

The cork is sorted into four grades, after which it is put into sheet-iron boxes and steamed, so it will not take the temper out of the circular knives or punches which slice up the cork and make it into stoppers. The hollow punch which cuts into the cork twists around about eight hundred times a minute as it goes through the sheet, and the disk-shaped knife, revolves six hundred times a minute. The circular knife which slices the cork into strips, which are just as wide as the corks to be punched from them,

is a disk of fine-tempered, thin steel about twenty-eight inches in diameter. The revolving knife cuts the cork across the grain, the strips varying in length from eight to eighteen inches, and in width between about the same limits. The punches or cutters are hollow cylinders, made of the finest grade of tool steel, and they vary from an eighth of an inch to two and a half inches in diameter. The punch works horizontally and is held in place by a chuck on the end of the shaft. The shaft is drawn forward against the strip of cork, which is held against a stop. A straight cork is made every time the shaft is drawn forward. As the punch returns to its original position, the cork is forced out of it by a plunger, and it rolls into a basket beneath. About eighteen thousand corks can be punched in a single day by one of these machines. The leavings from the strips of cork are granulated for insulating material and packing for ice-houses and refrigerators. The straight corks are taken to a tapering machine, which is a large circular knife revolving in a horizontal position. The corks are fed into a device which carries them up against the knife. The cork is held in a slanting position, and the knife cuts off shavings so as to give a bevel, or taper, to the cork. The corks are then sorted into different grades and are placed in packages for shipment.

Cork, a city in the south of Ireland, capital of the county of Cork, situated on the River Lee, 137 mi. s. w. of Dublin. It is built partly on an island and partly on the banks of the river, which is crossed by nine bridges. It has a large, safe harbor, formed by the estuary of the Lee at the mouth of which is Queenstown. There are in the city four monasteries, a fine cathedral, a free library, schools of science and art, Queen's College, a large park and many beautiful residences. Cork has a large export and import trade. The principal manufactures are leather, iron, glass, gloves, paper and liquors. There are also iron foundries, yards for the building of iron ships and important fisheries. Cork was founded in 622, was taken by Cromwell in 1649 and in 1690 by Marlborough. Population in 1911, 76,632.

Corliss, George Henry (1817-1888), an American inventor, born at Easton, N. Y. The construction of stationary steam engines was revolutionized by his improvements, the most important being the introduction of a cut-off mechanism, by which the valves are opened and closed instantaneously. Corliss invented many ingenious devices, and furnished the Corliss

Cormorant

engine which moved all the machinery at the Philadelphia Centennial Exhibition in 1876.

Cor'morant, a large web-footed bird, having a long and strongly-hooked bill, a long neck, short wings and a rather long, rounded tail. The cormorants, of which there are several species, are excellent swimmers and divers, and yet they often perch on trees. In color they are



CORMORANT

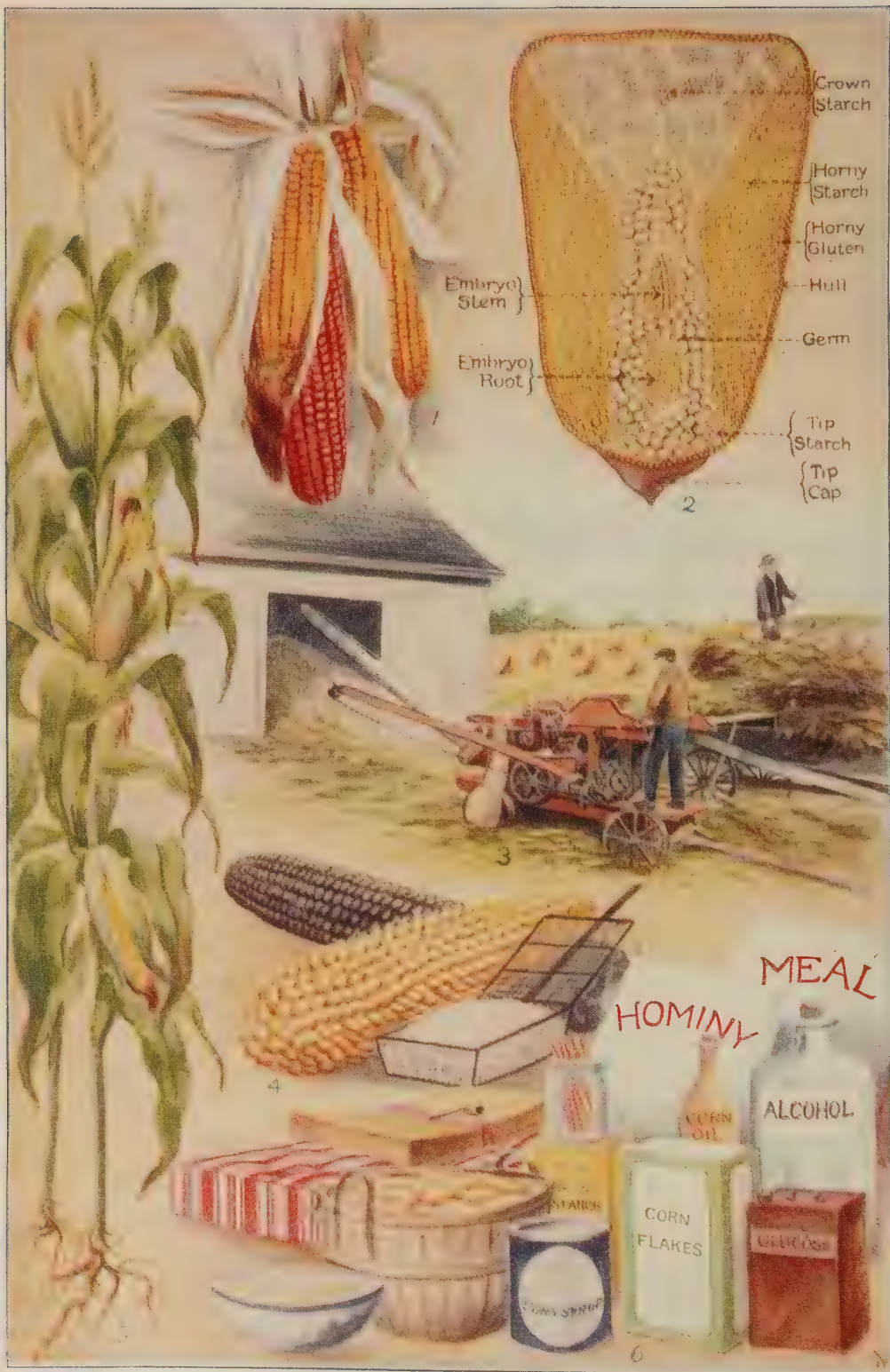
generally black or dark. The double-crested cormorant is found occasionally in the inland waters of the United States and often along the coast. The common European cormorant is larger than a goose, but has smaller wings. The Chinese have for many centuries trained the cormorants to fish for them, which they do very successfully, obediently bringing the fish to their masters without mutilation.

Corn, INDIAN, a plant of the grass family, extensively cultivated for its seed. In general appearance the plant resembles the sugar cane and sorghum. The stalks are from four to twelve feet high, according to the variety, are jointed at frequent intervals, are of a dark purple and green color and are concave on one side. The leaves are long, slender and pointed and are of a dark green color. The fruit, called the *ears*, grows from the axles of the leaves. The plant has two kinds of flowers, those at the top of the stalk, bearing the stamens and forming the *tassel*, and those on the ear, constituting the *silk* and bearing the pistils. Each thread of the silk is a pistil which terminates in a kernel. The seeds or kernels are arranged in rows around a

Corn

thick stem called the *cob*. The ears may have eight or twelve or more rows, but they always have an even number. The ears are covered with long, slender glumes called *husks*. Corn is a native of America and was not known previous to the discovery of the New World. Columbus and other early explorers found it in general use among the indians, for whom it constituted the chief article of food. The Aztecs and Incas had developed its cultivation to such an extent that they raised corn of a good quality. In its native state the plant belongs to the warm temperate and semi-tropical regions, but by cultivation it has been made to extend over a wide range of latitude, in the United States being cultivated as far north as the 46th and 47th parallels. There are a large number of varieties, those adapted to the short seasons of the cool temperate regions being much smaller in stalk and seed than those growing in the warmer portions of the corn belt. The important varieties are the flint corn, dent corn, sweet corn and pop corn. *Flint* corn has a small stalk, seldom exceeding six feet in height, and small, closely compact ears and very hard kernels. Its color is either white or a deep yellow. The yellow variety is the corn generally raised throughout New England, New York and the northern portions of Wisconsin and Minnesota. The *dent* corn contains the largest number of varieties and is by far the most important. This is the corn grown all over the region known as the corn belt of the United States and furnishes nearly all the crop raised in the country. It takes its name from the peculiar form of the kernels, which have an indentation on the outer end and taper to a point. Under suitable conditions the stalks attain a height of from eight to ten feet and sometimes grow as high as twelve or fourteen feet, but this is uncommon. *Sweet* corn contains a larger proportion of sugar than the other varieties, its small kernels are soft and nutritious, and it is raised for food, being eaten green or canned in large quantities. *Pop* corn takes its name from the peculiarity of the kernel of cracking open when heated. The kernels are small and enclosed in an exceedingly tough outside covering. When heated, the steam arising from the moisture in the interior bursts this covering and causes the kernel to turn itself inside out.

Corn is planted, cultivated and harvested almost entirely by machinery. The seed is planted in rows about four feet apart, and the hills are the same distance from one another. As



CORN

1, Cluster of Ears.
2, Detail of Kernel.

3, Husker and Shredder.
4, Popcorn.

5, Corn Plant.
6, Corn Products.

Corn

soon as the young plants appear the cultivation begins and must be continued every few days until the plants become so large that they are liable to injury from the cultivator. The crop is then allowed to ripen. The methods of harvesting depend upon the use for which the crop is intended. If only the ears are desired, the plants may be left standing until the seed is thoroughly ripened and dry. The ears are then broken off, husked and placed in granaries. But if the stalks are desired for fodder, the plants must be cut before the ears are dry, otherwise they will lose much of their nutriment. Corn harvesters are now in general use on the large farms (See CORN HARVESTER). The most complete of these machines not only cut the stalks, but break the ears and remove the husks from them at the same time.

Corn is one of the most valuable food plants in the world and is eaten by more people than any other grain except rice. When ground into meal it can be served in a great variety of ways. By cracking the kernels *hominy* is made, which is cooked by boiling and usually eaten in milk. By soaking the kernels in a weak lye and rubbing them, the outside coating or hull is removed, forming *hull corn*, which is now canned in large quantities and extensively used for food. But the most extensive uses of corn are in the manufacture of starch, glucose and alcoholic liquors. Corn oil is made from the germs, which are taken from the kernels in the manufacture of starch and glucose, and is used for burning and other purposes. Corn is also a most valuable fodder and may be fed either in the ear or when ground into meal. The stalks are of equal value with hay, but need to be cut or shredded and are improved by steaming and mixing with some concentrated food. Green corn is extensively used as fodder in localities where pasturage is scarce, and in nearly all dairy countries it is raised in large quantities for ensilage.

The United States raises four-fifths of the corn produced in the world. The annual crop averages about 2,250,000,000 bushels, valued at over \$700,000,000. Corn-raising forms the most extensive agricultural industry of the country, the income from this crop exceeding that from wheat and cotton combined, our two next largest crops. The leading corn-producing states are Iowa, Illinois, Nebraska and Kansas, though it is raised in quite large quantities in other states of the Mississippi Valley. Foreign countries producing corn in considerable quanti-

Cornelia

ties are Canada, Argentina, Austria-Hungary, Italy, Russia and Egypt. See GLUCOSE; STARCH; GRAINS.

Corn Crane, a name given in England to a pretty, reddish-brown bird, with dark streaks along the center of its feathers, and with a whitish breast. It is one of the rails and is a favorite bird in early summer. Its name has been acquired by its clear little note of *crake, crake*.

Cornea, *kor'ne ah*. See EYE.

Corneille, *kor na'y'*, PIERRE (1606-1684), one of the greatest of French dramatists. Previous to 1636 he had published various comedies and tragedies, which, while they were far superior to the dramas then on the stage, had not established his claim to a high rank. But in 1636 appeared his famous *Cid*, and at once he was recognized as the greatest dramatist which France had thus far produced. After the *Cid*, *Horace*, *Cinna* and *Polyeucte* appeared in rapid succession, works which show Corneille's genius at its best. The works which followed these added little to his fame. Corneille observed in his tragedies the three unities of the Greeks, making his action take place within twenty-four hours and within one town, and relating every incident to a central plot.

Cor'nel, a name given to various plants which belong to the genus *Cornus*, of which there are about twenty species, mostly natives of the northern hemisphere. The English species, known as the *cornelian cherry*, is a small shrub, with greenish flowers and an oblong fruit, which has a sour but rather agreeable taste. In the United States none of these plants are cultivated as a fruit tree. The common dogwood is a small tree, which in early spring puts forth clusters of small green flowers, each cluster having four large white bracts beneath it, giving to the whole cluster the appearance of one large, handsome flower. No tree makes a pleasanter impression in early spring, as these flowers precede the leaves by some time. In the northern United States a little herb known as the *bunch berry*, or *dwarf cornel*, grows to a height of three or four inches and bears red, fleshy berries, in the midst of a whorl of green leaves. There are a number of other native species of dogwood, but none of them is particularly noticeable or attractive, though the red twigs of one species make a handsome showing in the swamps during early spring.

Corne'lia, a Roman matron, the daughter of Scipio Africanus the Elder, and the mother of

Tiberius and Caius Gracchus. Her sons were educated under her supervision, and much of their lofty character was doubtless due to her training. When asked at one time to show her jewels, she led forward her sons, with the words, "These are my jewels." On a statue erected to her memory are the words "Cornelia, Mother of the Gracchi."

Corne'lian. See CARNELIAN.

Corne'lius, PETER VON (1783-1867), a German painter, the founder of modern German art. In 1811 he went to Rome, where, in conjunction with Overbeck, Veit and other associates, he may be said to have founded a new school of German art. He also revived fresco painting in imitation of Michelangelo and Raphael. His frescoes of the *History of Joseph*, in the house of the Prussian consul of Rome, those of scenes from the *Iliad* and of the *Last Judgment* are especially good.

Cornell', EZRA (1807-1874), an American inventor and philanthropist, born in New York State. He had very little education and began his career as a mechanic. His first work was in connection with the construction of telegraph lines, and the system of stringing wires on poles originated from his suggestion. After this he began to organize telegraph companies and gave much of his time to the construction of lines, in which business he amassed a large fortune. He is most widely known as the founder of Cornell University, at Ithaca, N. Y., to which he gave \$500,000. See CORNELL UNIVERSITY.

Cornell University, an institution of higher learning, at Ithaca, N. Y., founded in 1865 by Hon. Ezra Cornell. The plan of the whole institution was modeled with a view to the practical tendencies of the times. It comprises the following departments: graduate department, academic department, college of law, medical college, college of agriculture, state veterinary college, college of forestry, college of architecture, college of civil engineering and Sibley College of Mechanical Engineering and Mechanical Arts. The faculty numbers about 600, the enrollment is about 5000 and the libraries contain 370,000 volumes. John G. Schurman is president of the institution.

Cor'net, a wind instrument of brass, with a cup-shaped mouthpiece, resembling the bugle in construction, but differing from it in the possession of three keys, or pistons, which can be pressed down by the fingers, giving a wide range of tones. It has a very agreeable tone and is

much used in orchestras and military bands and with the organ.

Corn Har'vester, a machine for cutting corn and binding or shredding the stalks. The ordinary corn harvester comprises a cutting and a binding apparatus. The cutting apparatus is similar to that of the reaping machine, except that the knives work with a slower motion and are usually attached to a chain, instead of to a bar, and have their uniform speed maintained by a balance wheel (See REAPING MACHINE). The binding device is also an adaptation of the apparatus of an ordinary harvester and binder. As the corn is cut, the stalks are pushed under the binding frame and raised on a circular platform. When the frame has been filled, the shock is bound, and an automatic lifting device hoists it from the table and sets it on the ground. The modern corn harvester has a shredder and husker combined with it. This consists of an inclined box, or trough, the bottom of which contains two or four parallel rollers, running lengthwise. These rollers contain flanges and operate in pairs, the rollers of each pair turning inward toward each other. As the stalk slides down the incline, the rollers first break off the ears, then strip the husks from them. The stalk falls through to the ground through one opening and the ears through another. This machine requires three or four horses to operate it.

Corn'ing, N. Y., one of the county-seats of Steuben co., 18 mi. n. w. of Elmira, on the Chemung River and on the New York Central and other railroads. The city has extensive coal mines, foundries, railroad car works and manufactures of glass, terra cotta goods, brick and lumber. The important buildings include the city hall, a free academy and Saint Mary's Orphan Asylum. Corning was incorporated as a village in 1849 and became a city in 1890. Population in 1910, 13,730.

Corn Laws, a name commonly given to certain statutes passed by the Parliament of Great Britain to regulate trade in grains. The first form of interference by legislative enactment with the trade in England, beginning soon after the Norman conquest, was the prohibition of exportation, an expedient used in those times to prevent scarcity in a sudden emergency. The policy was continued, with slight changes, till the time of Charles II, when import duties, upon a sliding scale, were for the first time introduced. These remained in force till 1846, when Sir Robert Peel, influenced by a popular agitation,

Corns

and more especially by the Anti-Corn-Law League, headed by Cobden and Bright, carried a measure repealing the duty on imported grain, except a nominal sum of one shilling per quarter. This also in 1869 was done away with, thus leaving the importation entirely free.

Corns, small, hard growths in the cuticle or true skin, which usually appear upon the feet where pressure and friction are brought to bear. There are three varieties of corns, recognized by the way in which they grow, the most common being the *fibrous* form, in which the surfaces are convex and are sunk into the skin, occasionally causing serious changes in the formation of the joints. In *soft* corns the cuticle does not harden, but painful ulcerations appear, which need careful attention. Horses, as well as mankind, are affected by corns, and often serious lameness is caused unless the ailment is treated. Poorly set shoes and careless cutting away of the outer edge of the hoof may produce the trouble.

Cor'nuco'pia (horn of plenty), a wreathed horn filled to overflowing with fruit, flowers and grain, used as the symbol of plenty. In art it is frequently represented as held by the Goddess of Plenty or some other symbolic figure.

Corn'wall, a manufacturing town of Ontario, Canada, situated on the north side of the Saint Lawrence, 67 mi. s. w. of Montreal, on the Cornwall Canal and on the Ottawa & New York railway. Many woolen, paper, flour and cotton mills take advantage of its water power. Population in 1911, 6598.

Cornwallis, *korn wol'is*, CHARLES, Marquis of (1738-1806), a British soldier and statesman. On the outbreak of the American war he sailed for America with his regiment, although he was opposed to the war. He took part in the Battle of Long Island and afterward pursued Washington through New Jersey; but a part of his army was captured at Trenton, and he himself was defeated at Princeton. The victory of the British at Brandywine was due largely to him, and he fought against General Gates at Camden and General Greene at Guilford. Six months later he was besieged in Yorktown and was compelled to surrender, October 19, 1781. In 1786 Lord Cornwallis went to India as commander in chief and governor general, invaded Mysore in 1791 and obliged Tippu Sahib to surrender much territory. On his return to England he was created a marquis and appointed lord lieutenant of Ireland, and again in 1805 he became governor general of India.

Corporation

Corol'la. See FLOWERS.

Cor'oman'del Wood, the wood of a tree found in Ceylon. Its ground color is chocolate brown, with black stripes and marks. It is hard, turns well and makes very handsome furniture.



GORNWALLIS

Corot, *ko ro'*, JEAN BAPTISTE CAMILLE (1796-1875), a French artist, born at Paris. His merit was not recognized at first, but in his later life honors were heaped upon him. He painted large sacred pictures, the *Flight into Egypt* and the *Baptism of Christ*; but his most characteristic and successful work was in landscape. His woodland scenes, painted for the most part at dawn or twilight, in a scheme of pale greens and silvery grays, show a singularly subtle feeling for this phase of nature, and are undoubtedly among the most important contributions of the century to landscape art. Among his works are *Dance of the Nymphs*, *View of Narni* and *Bath of Diana*.

Cor'pora'tion, an association of persons which the law treats in many respects as if it were itself a person. It has rights and duties of its own, which are not the rights and duties of its individual members. Thus, a corporation may own land, but the individual members of the corporation have no rights therein A

corporation. may owe money, but the members as individuals are under no obligation to pay the debt. If, however, an individual has not paid up his stock in full, he is liable for the amount unpaid. The corporation is not dissolved by the death or withdrawal of members, or the substitution of other members, but the rights and duties of the corporation descend to the corporation as newly constituted. This capacity of perpetual succession is regarded as the distinguishing feature of corporations, as compared with other societies. The conception of a corporation has been taken full grown from the law of Rome. The technical term in Roman law corresponding to our corporation is *collegium*.

Corporations are divided into two main classes, public and private. *Public* corporations are those created for government purposes, such as corporations of states, counties, cities, villages, or incorporated official boards of officers, as a park board. Of *private* corporations, there are four classes:

1. A corporation for the benefit of the members. In such a corporation there is no stock, no capital and no pecuniary profit. Examples are social, artistic, scientific, religious and professional societies.

2. Corporations for the pecuniary profit of individual members. The basis is a capital fund engaged in commercial enterprise. Shares of stock are held by stockholders. Such corporations are regulated in the United States by statutes, which designate the relations and privileges of the corporation. Such corporations are organized and chartered for specific purposes and cannot transact business other than that for which they are organized. Examples are railroads, telegraph and telephone companies, insurance and banking corporations. The profits are divided pro rata among the stockholders. (See INCOME TAX.)

3. Corporations for mutual aid and relief. The first object is the element of personal membership and benefit; the division of profit is a secondary consideration. Examples are building and loan associations, coöperative societies and lodges of various kinds. Such corporations are generally under state control.

4. Incorporated trusts. Such corporations have a fund set apart for some special purpose, held usually by a board of trustees. Examples are colleges, hospitals and charitable associations.

A corporation is usually formed by legislative act, and, more and more generally, in accordance with a general act, providing a certain set of

steps for incorporation. It may be dissolved by the death of all its members, or of such number as leaves not enough to make new elections in the way the charter requires; by forfeiture of the charter through breach of its conditions, or by surrender of the charter. In all such cases the lands of the corporation revert to their several donors, the creditors, however, if any, being entitled in the first place to insist on a sale and distribution of the property.

The power of the majority of shareholders to bind the society is one of the first principles of corporation law, even in cases where the corporation has a head. The binding majority is that of the number present at a corporate meeting duly summoned. A corporation has power to make such regulations (by-laws) as are necessary for carrying out its purposes, and these are binding on its members and on persons within its local jurisdiction, if it has any. Such by-laws must not be at variance with the law of the land, nor retrospective in their operation, nor unreasonable. They must, further, be in harmony with the objects of the society and must not infringe or limit the powers and duties of its officers. See TRUSTS.

Corpus Christi, TEXAS, the county-seat of Nueces co., is situated on Corpus Christi Bay at the mouth of the Nueces River, 200 mi. s. w. of Galveston, and on the Mexican National, the San Antonio and the Arkansas Pass railroads. The city is an important shipping point for fish and other products. Population in 1910, 8222.

Correggio, *kor red'jo*, ANTONIO ALLEGRI (1494-1534), a famous Italian painter, born at Correggio, near Modena. Correggio is unrivaled in his handling of light and shade, in the grace and rounding of his figures and in the beauty of their expression. Among his best pictures are *Night*, *Saint Jerome*, *Marriage of Saint Catharine*, the *Penitent Magdalene*, the altar pieces of *Saint Francis*, *Saint George*, *Saint Sebastian*, and several madonnas.

Cor'rela'tion, in pedagogy, the natural relation which different subjects of learning bear to one another. The principle of correlation was recognized by Pestalozzi, Froebel and Herbart, each of whom regarded it as an important law in education. For a time correlation was greatly neglected by educators, but it has recently been recognized again and given a prominent place in all systems of primary and secondary instruction. Correlation considers the relation of each subject to other subjects; as, the relation of geography to nature study. See

METHODS OF TEACHING; also articles on teaching the various common branches.

Correspondence Schools. See **SCHOOLS, CORRESPONDENCE.**

Corrigan, MICHAEL AUGUSTINE (1839-1902), a Roman Catholic prelate and a scholar of fine attainments, born at Newark, N. J. In 1859 he graduated from Mount Saint Mary's College, Emmetsburg, Md., and was one of the twelve students with whom the American College at Rome was begun. In 1863 he was ordained priest, was professor in, and afterwards president of Seton Hall College, South Orange, N. J. In 1873 he was made bishop of Newark and in 1885 archbishop of New York.

Corro'sive Sub'imate, the bichloride of mercury, a white crystalline solid, a burning poison of great strength. The stomach pump and emetics are the surest preventives of its harmful effects, when accidentally swallowed; white of egg is also serviceable in stopping its poisonous influence on the stomach. It is a powerful antiseptic.

Cor'ry, PA., a city in Erie co., 37 mi. s. e. of the city of Erie, on the Pennsylvania and other railroads. Petroleum is found in the vicinity, and there are extensive steel works, machine shops, flour mills, brickyards and manufactures of engines, furniture, tools and other articles. The city has three valuable mineral springs and is the seat of the state fish hatchery. Corry was settled in 1860. Population in 1910, 5991.

Cor'sairs; the term used to denote those pirates who sailed from Algiers, Tunis, Tripoli and the ports of Morocco. The name was also given to the vessels used by these pirates.

Cor'sica, an island in the Mediterranean, 100 mi. s. of France, famous as the birthplace of Napoleon. It is the fourth in size of the islands of the Mediterranean, being about 110 miles long and 59 miles wide, and having an area of 3367 square miles. There are fine forests, containing pine, oak, beech, chestnut and cork trees, and the mountain scenery is splendid. In the plains and numerous valleys the soil is generally fertile, but agriculture is in a backward state. Mules, goats, horses, cattle and sheep, and, among wild animals, the boar, the fox and the deer are common. The chief exports are wine, brandy, olive oil, chestnuts, fruit and fish. The chief towns, Ajaccio, the capital, and Bastia, are connected by railway. The island was first colonized by the Phoenicians, from whom it received the name of Cynos. The Romans afterward gave it that of Corsica. From the

Romans it passed to the Goths, from them to the Saracens, and in the fifteenth century, to the Genoese, who ceded it to France in 1768. The British gained control of it in 1794, but were obliged to yield it again to France in 1796. Population in 1911, 288,820.

Corsicana, *kor se kah'na*, TEXAS, the county-seat of Navarro co., 163 mi. n. e. of Austin, on the Houston & Texas Central and other railroads. There are many oil wells in the vicinity, and the city is quite a manufacturing center. It has cottonseed oil mills, brickyards, flour mills, grain elevators and manufactories of cotton presses and cotton gins. Population in 1910, 9749.

Cortel'you, **GEORGE BRUCE** (1862-), an American statesman, born in New York and educated at Georgetown University and Columbian Law School. For several years he was a court reporter in New York and afterwards was principal of preparatory schools in that city. In 1889 he entered the government service and was successively private secretary to various officials, until November, 1895, when he became stenographer to President Cleveland. He held this place until July, 1898, when he was appointed assistant secretary to President McKinley. In 1900 he was made secretary to the president and he was reappointed by President Roosevelt. President Roosevelt made him first secretary of the department of commerce and labor. In 1904 he was chairman of the Republican National Committee. In 1905 he was made postmaster general, and in 1907, secretary of the treasury. In 1909 he engaged in business.

Cortes, *kor'tas*. See **SPAIN**, subhead *Government*.

Cortez, *kor tays'*, **HERNANDO** (1485-1547), the conqueror of Mexico, born at Medellin. He went to the West Indies in 1504, and in 1518 he set out from Santiago de Cuba with eleven vessels, about 700 Spaniards, eighteen horses and ten small field pieces. He landed on the shore of the Gulf of Mexico, where he caused his vessels to be burned, in order that his soldiers might have no other resources than their own valor. After meeting stubborn resistance from several tribes near the coast, he was able to go on his way toward the Aztec capital. Montezuma received him in a friendly spirit and housed the Spanish leader hospitably. Cortez learned of a conspiracy against him and by trickery secured Montezuma as a hostage. The Aztec king died, and the Spaniards were driven from the city with great loss. It was not until the middle

of 1521 that Cortez was able to re-enter the city, for the Aztecs fought stubbornly and well (see MONTEZUMA; AZTEC). In 1528 Cortez returned to Spain, but two years later he was again sent out to Mexico, where he remained for ten years.



HERNANDO CORTEZ

Cort'land, N. Y., the county-seat of Cortland co., 37 mi. s. of Syracuse, on the Tioughnioga River and on the Erie and the Lackawanna & Lehigh Valley railroads. The manufactures of the city include wire and wire products, carriages and carriage parts, wall paper and other articles. It is the seat of a state normal school. The place was settled in 1792. Population in 1910, 11,504.

Corun'dum, the earth alumina, as found native in a crystalline state. In hardness it is next to the diamond. The amethyst, ruby, sapphire and topaz are considered varieties of this mineral, which is found in India and China, usually in the form of a six-sided prism or six-sided pyramid. It is nearly pure anhydrous alumina, and its specific gravity is nearly four times that of water. Emery is a variety of corundum. Its color, which is due to traces of iron, copper and other metals, may be green, blue or red, inclining to gray. Emery is found at some places in the United States and Canada.

Cor'win, THOMAS (1794-1865), an American lawyer and statesman, born in Kentucky. He studied law and began to practice in Ohio, where

he soon won fame as an eloquent attorney and was elected to the legislature, to Congress and finally to the governorship. For six years following 1844 he was a member of the Senate, later secretary of the treasury and finally minister to Mexico. He is especially well known for his famous speech against the Mexican War, which, however, cost him the favor of his constituents.

Coshoc'ton, OHIO, the county-seat of Coshoc-ton co., 69 mi. n. e. of Columbus, on the Muskingum River and on the Wheeling & Lake Erie and the Pennsylvania railroads. The city has machine shops, novelty works and glass and other factories. It was settled in 1811 and was incorporated in 1833. Population in 1910, 9603.

Cos'sacks, tribes who inhabit the southern and eastern parts of Russia, paying no taxes, but performing, instead, the duty of soldiers. Writers are not agreed as to the origin of this people and of their name, but they now differ from the Russians more in their manner of life than in blood and lineage. Originally their government formed a kind of democracy, at the head of which was a chief, or hetman, of their own choice. The democracy has gradually disappeared under Russian domination. The title of chief hetman is now vested in the heir apparent to the throne, and all the subordinate officers are appointed by the crown. Care, however, has been taken not to interfere with any arrangements which foster the military spirit of the Cossacks. Each Cossack is liable to military service between the ages of eighteen and fifty, and is obliged to furnish his own horse. The Cossacks are the most valuable elements in the national army, forming a first-rate irregular cavalry that has been one of the mainstays of the government in dealing with its rebellious subjects or its foreign enemies. In 1570 the principal tribe, the Don Cossacks, built their principal rendezvous, called Tcherkask, on the Don, not far above its mouth. As it was rendered unhealthy by the overflowing of the island on which it stood, New Tcherkask was founded in 1805, some miles from the old city, and to this nearly all the inhabitants removed. The province has an area of about 62,000 square miles and a population of over one and a half million.

Costa, *ko'sta*, SIR MICHAEL (1810-1884), an Italian-English composer and conductor. He studied under Zingarelli and first attained distinction in 1828 as a tenor singer in a musical production at Birmingham, England. Elated by his success, he remained in England, and in



COTTON

1. Shipping Cotton.
2. Blossom.
3. Calico.

4. Cotton Plant.
5. Cotton Oil.

6. Cotton Fiber.
7. Boll open.
8. Cottonseed Meal.

9. Cottolene.
10. Spinning Frame.

11. Loom.
12. Gin and Press.
13. Cotton Field.

1847 he became conductor at Covent Garden Opera and at other musical festivals. His most important works are the oratorios *Eli* (1855) and *Naaman* (1864).

Costa Rica, *ko'sta re'ca*, the most southern state of the republics of Central America. Its area is 18,400 square miles. The country is intersected diagonally by the primary range, or cordillera, of the isthmus, some peaks of which attain elevations of 10,000 to 11,000 feet. There are a number of volcanoes, and earthquakes are frequent. Costa Rica is said to contain some rich gold mines; at present, however, they are not worked to a great extent. Silver and copper are also found. The country is extremely fertile, coffee, rice and maize being raised on the tableland in the interior, and cacao, vanilla, sugar, cotton and tobacco being cultivated in the low coast regions. The forests are valuable and cover a large part of the country. The capital is San José, and the two established ports are Punta Arenas, on the Pacific side, and Porto Limon, on the Caribbean Sea. From 1823 to 1839 Costa Rica was a part of the United States of Central America. It has been an independent republic since 1848. Population, estimated at 380,000.

Cos'ter, LAURENS (1370-1440), whose name is connected with the origin of printing, was born in Haarlem, Holland. His claim to the invention of printing with movable types has been defended by Dutch scholars. Investigations by Van der Linde in 1870 and by others in 1900 show that his claims are without foundation. See PRINTING.

Cos'tume. See DRESS.

Cotopaxi, *ko to pak'se*, the most remarkable volcanic mountain of the Andes, in Ecuador, about 60 mi. n. e. of Chimborazo. Its altitude has been estimated at 19,500 feet. It is the most beautiful of the great summits of the Andes. Recent eruptions have occurred, one of the most violent in 1768 and one in 1877.

Cotton, a plant of the mallow family, extensively cultivated for its fiber. The cotton plant is closely allied to the marsh mallow and the hollyhock. It was originally a tropical plant, but cultivation has extended its range to about the fortieth parallel on each side of the equator; it will not thrive where the mean annual temperature is not over 60°. It requires a soil consisting of a sandy loam containing large amounts of lime and phosphate, and rainfall of not less than forty inches, so distributed as to leave a gradually drying season in which to

mature. The plant most extensively cultivated in the United States attains a height of about two feet, while that known as *sea-island* cotton may grow as high as eight or ten feet. The leaves are dark green, with blue veins. The flower resembles a single hollyhock. The seed vessel, or fruit, is a round pod called the *boll*. It is this which contains the cottony fiber for which the plant is valued. When the seed is ripe the bolls burst and the white fiber appears.

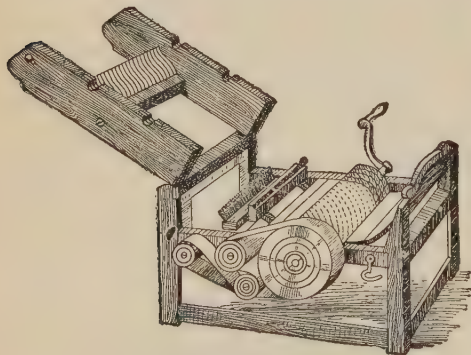
After the land is well plowed, the usual method is to bed up the ground in rows from three to four feet wide. The seed is dropped in the center of these rows, five or six seeds at a time, either in narrow furrows or in holes about a foot apart. As more than one plant every twelve inches is not considered advisable, the plants are thinned out after two weeks' growth. Planting commences about March 1st in southern Texas and continues to the end of May in the Piedmont region of North Carolina and other sections as far north. Deep cultivation is best for the plant, but exhausts the soil. Weeds and grass must be carefully kept down.

Two varieties of cotton, known as the *upland*, or short fiber, and the *sea-island*, or long fiber, are raised in the United States. The upland variety is the one generally cultivated, and it is from this that the market price is determined. The sea-island cotton can be grown only upon low lands and takes its name from the fact that it was first raised on islands off the coast of South Carolina and Georgia. What is known as the cotton belt in the United States includes South Carolina, Georgia, Alabama, Mississippi, Louisiana, Texas, Arkansas and Oklahoma, including the former Indian Territory. Cotton can be raised in nearly all states south of the thirty-sixth parallel, north latitude, and east of the Rocky Mountains. Texas is the leading state in its production and usually produces more than any other two states. The annual product of the United States is about ten and one-third million bales of 500 pounds each.

As fast as the bolls ripen they must be picked. Since only a portion of the bolls ripen at the same time, there must be several picking times for the field. Formerly the picking was all done by hand labor, but successful cotton-picking machines have been invented and are in use in large fields. They save considerable expense in harvesting the crop. When the cotton is picked it is sent to the gin house, where it is ginned, or separated from the seeds. The fiber is then placed in presses and pressed into

bales of 500 pounds each. These are bound with iron hoops, when they are ready for shipment. The United States raises about four-fifths of the cotton grown and supplies the markets of Europe as well as the mills in our own country. The leading ports from which cotton is exported are Galveston, New Orleans and Savannah. That retained in the country is manufactured in the great cotton mills of the New England states and in those more recently built in North Carolina, South Carolina, Georgia and Alabama.

Cotton has been used since about the eighth century B. C. It was known to the Egyptians, the Greeks and the Romans, and its cultivation was introduced into Europe by the Mohammedans during the Middle Ages. The European cotton is probably a native of India, but the plant is also native to America. When this continent was discovered the inhabitants of Mexico and Peru had attained a good degree of skill in raising cotton and manufacturing it into cloth. The planting of cotton began in the Southern states soon after the settlement of the older colonies, but the expense of separating the fiber from the seed was so great that cotton was not a profitable crop. In the latter part of the seventeenth century the invention of the



FIRST COTTON GIN

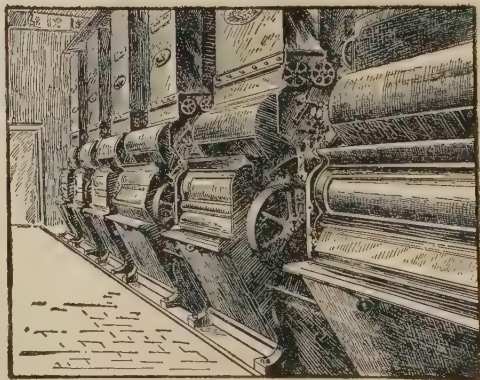
power loom and the mule jenny for spinning so increased the facilities for manufacturing cotton goods that enough cotton could not be raised to supply the demands of English manufacturers. In 1793 the cotton gin was invented by Eli Whitney (See COTTON GIN; WHITNEY, ELI). This machine enabled one man to do more in separating the cotton from its seeds than a hundred men could accomplish by hand labor, and it revolutionized the cotton industry. Of all the fibers used in the manufacture of cloth, cotton is the most extensively employed. It can

be made into almost all grades of fabric, from the heavy canvas to the most delicate muslin. It is easily dyed to almost any tint or hue, and fabrics made from it are reasonably durable. These qualities, combined with its cheapness, create for it a universal demand. But the fiber is not the only valuable part of the cotton plant. The seeds are used in the manufacture of cotton-seed oil, and the cake from which the oil has been pressed is ground into a meal that is used as fodder and as a fertilizer for cotton lands.

DESTRUCTIVE INSECTS. Cotton is subject to damage and destruction by a number of insects, the worst being the cotton worm and the boll weevil. The worm is the larva of a moth having a reddish-brown body and brown and gray wings. The worm feeds upon the leaf and destroys the foliage of the plant. The boll weevil is the larva of an insect that lays its eggs on the growing boll. The larvae bore into the boll and attack the seeds and fiber, spoiling the fiber for spinning. The United States Department of Agriculture has given much attention to the extermination of these pests. See CLOTH, SPINNING; WEAVING.

Cotton, JOHN (1585-1652), a Puritan clergyman and profound scholar, born at Derby. He was tutor at Cambridge, had a charge in Lincolnshire about 1612, and when summoned to appear before Laud in 1633 because of his Puritan views, he fled to Boston, New England, and preached there till his death. Cotton was the author of a catechism, forms of prayer and other works, and in a controversy with Roger Williams he defended the right of civil authority to interfere in religious matters.

Cotton Gin (a corruption of cotton engine),



BATTERY OF MODERN COTTON GINS

a machine for separating cotton fiber from its seeds. The cotton gin was invented by Eli

Cottonseed Oil

Whitney in 1793. The original machine consisted of a wooden cylinder, into which were fastened strong wire hooks resembling the teeth of a saw. The points of these hooks passed between vertical wires held by a frame, and as the cylinder revolved, the teeth drew the fiber between the wires and let the seed fall to the ground. The cylinder was afterwards replaced by saws operating on the same principle. A modern gin contains 70 saws and will clean 5000 pounds of cotton in 12 hours. By diligent labor it was possible for one person to separate the seeds from one pound of fiber in a day by hand. See COTTON; WHITNEY, ELI.

Cottonseed Oil, a valuable oil, pressed from the seeds of the cotton plant. It is used in the manufacture of cottolene, a substitute for lard, as a substitute for olive oil and for various other purposes. The oil cake of cottonseed is a valuable feed for cattle.

Cougar, *koo'gur*. See PUMA.

Cough, *koff*, usually an involuntary action of the muscles of the body, by which foreign substances are thrown out of the trachea or larynx. It really consists in driving a current of air forcibly outward through the trachea. Coughing is a symptom of disease when it occurs from irritation of the mucous membrane of the organs of respiration, and its treatment under such circumstances should be conditioned on the disease which causes the cough. In pneumonia, bronchitis, tuberculosis and catarrhal affections of the throat, coughing is a universal symptom.

Coulter, *kole'tur*, JOHN MERLE (1851-), an American botanist, successively professor of botany at Hanover College and Wabash College in Indiana, president of Indiana State University and head of the department of botany in the University of Chicago. Among his publications are *Plant Studies*, *Manual of Rocky Mountain Botany* and *Handbook of Plant Dissection*.

Council, *kown'sil*, **Bluffs**, IOWA, the county-seat of Pottawattomie co., 4 mi. e. of Omaha, near the Missouri River, and on the Union Pacific, the Chicago & Northwestern, the Chicago, Burlington & Quincy and other railroads. The city has an extensive trade in live stock, fruit and farm produce. Its manufactures include agricultural implements, lumber and paper. There are several beautiful parks. It is the seat of the Iowa School for the Deaf and the Christian Home. The city has an excellent school system. There are sixteen good school build-

Counter-Reformation

ings, a large number of churches and three well-equipped hospitals. In about 1804 Lewis and Clark are supposed to have held a council here with the Indians; hence the name, Council Bluffs. The Mormons settled here for a time, but in 1846 they moved to Salt Lake City. Council Bluffs was chartered as a city in 1850. Population in 1910, 29,292.

Counterfeiting, *kown'tur fit ing*, fraudulently producing an article in imitation of another, for the purpose of inducing the use of the false article for the genuine. The term is most commonly applied to the imitation of money. In the United States the offense is dealt with by Federal statute, especially the counterfeiting of money, and it constitutes a crime punishable by fine and imprisonment.

Count'point, in music, a term used to describe the adding, to a given melody or theme, of other melodies, independent of it in movement, but related to it by certain rules. When a single part is added, the result is known as *two-part counterpoint*. When two points are added, the result is *three-part counterpoint*. When the notes of the added parts are of the same value as corresponding notes in the original melody, the composition is known as *simple counterpoint*, and when more than one note of the added part are made equivalent to one note of the original melody the resulting composition is called *florid counterpoint*. The term is sometimes used synonymously with harmony. The name arose from the early system of notation, in which points were used for notes; hence one point was set opposite another point, *punctus contra punctus*.

Counter-Reformation. As the Reformation spread, the Roman Catholic Church attempted to counteract its influence by adopting certain measures to check its growth in those countries where it had already gained a hold, to prevent its further spread and to abolish abuses that had grown up in the Church. To these measures has been given the name of Counter-Reformation. The question of the reform of abuses had been receiving much attention in the Church previous to the beginning of the Reformation, but it was not until the Council of Trent (1545-1563) that any effective work was done toward this end. This council formulated a creed and discipline which is practically that of the modern Church, and which did away with the most flagrant abuses. The attempt to check the spread of Protestantism led in Italy and Spain to the Inquisition. In these two countries Protestantism was easily uprooted, because it had never

had there more than a feeble existence. In Bohemia it was abolished only by means of the Thirty Years' War, and in a number of other countries, particularly in the Netherlands, the attempt to replace it with Catholicism led to serious wars. See REFORMATION.

Coun'tersign, a private signal, word or phrase given to soldiers on guard, with orders to let no man pass unless he first give that sign; a military watchword.

Coun'ty, originally a district of a country subject to a *count* or earl. In the United States, it is now a civil district, corresponding with shire in England and Scotland, constituting in itself a unit of local government, and divided into smaller units, usually called *towns* or *townships*. See UNITED STATES, subhead *Government, Local*.

Coupé, *koo pay'*, a four-wheeled, inclosed carriage, with a low body and an outer seat for the driver. The term is often used very loosely and applied to broughams and cabs.

Coupling, *kup'ling*, in machinery, a contrivance for connecting one portion of a system of shafting with another. A common form is the flange or plate coupling, which consists of two flanges, separately fitted onto the two ends of the lengths of shaft to be connected, and firmly secured together by screws or bolts. The most useful kinds of couplings are those that are adjustable, or that can be readily put on and off. The term is also applied to an organ register, by which two or more rows of keys can be connected by a mechanism, so that they can be played together.

Court Fool, a name given to the professional jesters who were common at courts during ancient and medieval times. Such persons were known in the time of Philip of Macedon, but they formed a more important part of court life during the Middle Ages than at any other time. The fool dressed in gay colors, with a cap ornamented with bells and surmounted with ass's ears, carried a scepter, usually ornamented with bells, and wore a large collar. The Stuart kings were the last English kings to have court jesters, but at the Russian court such personages existed to the nineteenth century, and Marie Antoinette of France had a jester just before the Revolution. Shakespeare in several of his plays, as *King Lear*, *As You Like It* and *Twelfth Night*, introduces the court fool.

Court-martial, *kort mahr'shal*, a court consisting of military or naval officers, for the trial of military or naval offenses. In the army of the United States there are general courts-martial, before which only officers can be tried, and regi-

mental and garrison courts-martial. In the navy summary courts-martial are held for the trial of petty officers and persons of inferior rating, and general courts-martial for the trial of the higher officers.

Court'-plas'ter, black, flesh-colored or transparent silk, varnished over with a solution of isinglass and often perfumed with benzoin. It is now used for covering slight wounds, but it is said to have received its name from the fact that at one time the ladies of the court wore it on their faces in patches, to make their complexions appear more brilliant.

Courts, of law, institutions with authority to try and punish persons accused of committing offenses against the State, the public or individuals, and to settle controversies. Courts have existed from remote times and probably had their origin in the executive power possessed by kings or chiefs, or in the power of pardon belonging to priests and other church dignitaries. The systems of courts differ among different modern nations, but their general powers and constitutions are the same, their acts being in most cases independent of all other authority and their decisions being regarded as final in most cases. Courts of England are in four divisions: (1) the *county courts*, which have a large and constantly expanding jurisdiction in both civil and criminal cases; (2) the *high court of justice*, which consists of twenty-three judges and is divided into three divisions; the *court of chancery*, which handles cases of equity, the *king's bench*, which was originally a criminal court, but now includes civil jurisdiction, and the *probate, divorce and admiralty court*, whose jurisdiction covers the subjects indicated by its title; (3) the *court of appeal*, which can decide only cases appealed from the decisions of lower courts, and (4) the *House of Lords*, which is the supreme judicial, as well as the supreme legislative, body of the Empire. Within the counties are *justices of the peace*, who are usually country gentlemen of high standing, appointed for life to aid in preserving order. On the continent of Europe the highest judicial tribunal has generally only the power to return the case to a lower court for rehearing.

United States courts include Federal courts, controlled by Federal laws, and the state courts, controlled by state laws. The lowest Federal courts are *district courts*, which hear cases arising under Federal law in certain districts, no one of which crosses a state line. These districts are grouped together in nine circuits, in each of

which is held a *circuit court* and a *circuit court of appeals*. At the head of the whole system is the *Supreme Court of the United States*. The courts of the state differ in powers and jurisdiction in the various states. At the foot of the whole system are the *justices of the peace*, who try petty criminal and civil suits. In some states there are *county courts*, which hear appeals from justices and have original jurisdiction in some cases. Next come *circuit courts*, each of which has jurisdiction over several counties and hears appeals from the lower courts. Over all is the *Supreme court* of the state, usually a court of appeal only, but occasionally having original jurisdiction. Cases may be carried from the supreme court of the state to the Supreme Court of the United States, usually in questions involving the interpretation of the United States Constitution. See LAW; PROCEDURE; see, also, Vol. VI, CIVIL GOVERNMENT.

Cousin, *koo zaN'*, VICTOR (1792-1867), a French philosopher, historian and writer, the founder of an eclectic school of philosophy. He was educated at the Normal School and so distinguished himself as a student that when but twenty-three he was made deputy professor of philosophy at the Sorbonne. However, after two years he lost his position on account of his revolutionary political views and did not resume teaching for six years. During this time he visited Germany and became acquainted with German idealistic philosophy. On resuming teaching he became very popular. In 1832 he was made a peer of France, and in 1840 he was appointed minister of public instruction in the cabinet of Thiers. His public career came to a close soon after the Revolution of 1848. As a philosopher Cousin was not a propounder of any new system. The value of his labor consists chiefly in the unusual clearness and beauty of expression with which he explained the thoughts of his great predecessors and contemporaries, and in his translation of Plato, which is one of the best existing. His historical works consist chiefly of biographical sketches of leading characters of the seventeenth century. While minister of public instruction he made a careful investigation of the educational system of Germany and embodied the results in a report to the French government, which had a marked influence on the organization of primary education. See EDUCATION, NATIONAL SYSTEMS OF, subhead *France*.

Covenanters, *kuv'e nan turz*. See COVENANTS.

Covenants, *kuv'e nants*, a term used in the Bible in several indefinite senses, sometimes with the meaning of *promise*, sometimes in place of *agreement*. Covenants between man and man are frequently mentioned, but special emphasis is laid upon those between God and the Israelite nation, given through Noah, Abraham and others. This was a pledge of God's blessing upon the Israelites in return for their faith and devotion.

The same term was used by the Scottish people to denote associations or bands of persons joined together for mutual support and assistance, either in the maintenance of a principle or in resistance to oppression. Two of these covenants were especially noted, namely, the *National Covenant* of 1638 and the *Solemn League and Covenant* of 1643. The first had for its object the maintenance of the Presbyterian or Reformed religion and grew out of the fear in Scotland that Charles I would introduce the English *Book of Common Prayer* and increase the power of the Scottish bishops. The nobles opposed the latter act because of their jealousy of the bishops and their fear that Charles I would attempt to recover Church lands. The Commons opposed the introduction of the *Book of Prayer*, first because it was English; and second, because it seemed to be a step in the direction of popery. The *Solemn League and Covenant* was a contract entered into between the General Assembly of the Church of Scotland and commissioners in the English Parliament, according to which Scotland was to furnish an army to help the English against Charles I, upon the condition that Presbyterianism be made the established religion in England, Scotland and Ireland. Both covenants were abrogated after the restoration of the Stuarts in 1660, and their adherents were severely criticised and regained freedom of worship only after the revolution of 1688.

Covent, *kuv'ent*, **Gar'den**, a large market place in London, which was originally a garden belonging to the abbot and monks of Westminster. In the seventeenth century it was a very fashionable part of town and was not used as a market until 1656. In 1828 the present buildings were erected by the duke of Bedford, whose family had received the land as a gift of the crown.

Coventry, *kuv'ent ry*, a city of England in the county of Warwickshire, 85 mi. n. w. of London. It is also the Parliamentary and municipal borough for this county. Coventry is a place of great antiquity. In 1043 Earl

Leofric and his wife, Lady Godiva, founded here a Benedictine monastery, and many religious mysteries and pageants were acted before the king in the fifteenth century. Henry VIII destroyed this abbey and the ancient walls which surrounded the city. To-day there are several fine churches, Saint Michael's being the largest parish church in England. It is a prosperous manufacturing city, and owing to its rapid industrial growth the boundaries have been extended. Its chief manufactures are bicycles, ribbons, watches and fringes. Population in 1911, 106,377.

Coventry, R. I., a town in Kent co., 13 mi. s. w. of Providence, on the New York, New Haven & Hartford Railroad. It is in an agricultural district and has manufactures of cotton and woolen goods. The town was incorporated in 1871. Population in 1910, 5848.

Coverdale, *kuv'ur dale*, MILES (1488-1568), an English Bible translator. At the beginning of the Reformation he was in an Augustinian monastery at Cambridge, but he soon adopted the doctrines of the Reformation and became their very enthusiastic supporter. In 1535 he published the first complete English translation of the Bible, and the Psalms of his translation are still used in the Book of Common Prayer. In 1550 Coverdale was made bishop of Exeter. He held this office until 1553, when, on the accession of Mary, he was thrown into prison. The next year he was released and obliged to leave England, but after the accession of Elizabeth he returned.

Covington, *kuv'ing ton*, Ky., the county-seat of Kenton co., at the junction of the Ohio and the Licking rivers, opposite Cincinnati and on the Louisville & Nashville, the Chesapeake & Ohio and other railroads. The city is connected with Cincinnati and Newport by bridges, one to Cincinnati being a notable suspension bridge 2250 feet long. The place is a residence town for many Cincinnati business men. There are many handsome private dwellings and public buildings, among which are a public library, a fine Federal building, Notre Dame Academy and a beautiful cathedral. There are extensive distilleries, cotton and woolen mills, packing establishments and glass factories. The city was settled in 1812 and was chartered in 1834. Population in 1910, 53,270.

Cow. See CATTLE.

Cow'age. See COWITCH.

Cow'berry, the popular name for the small red huckleberry, edible only when cooked. See HUCKLEBERRY.

Cow'bird or **Cow Bunting**, an American bird of the starling family, which resembles the European cuckoo in that it lays its eggs in the nests of other birds and leaves them to be hatched by the foster parent. While a single bird lays several eggs, it has never been known to deposit more than one in the same nest. The small birds whose nests are used for this purpose do not usually seem to notice the difference, and the young cowbird, being larger, secures most of the food intended for the true children. Sometimes, however, the yellow warblers and other small birds recognize the presence of the intruding egg and abandon the nest or seal it over and build another upon the top of the old one, rejecting not only the strange egg but all of their own, as well. From its peculiar habit of making no nest, the cowbird is sometimes called the *lazy bird*. The cowbird is migratory and spends its winters regularly in the Carolinas and Georgia. The birds are to be seen usually in small flocks accompanying cattle, feeding on seeds and worms. There are usually more males than females in a flock.

Cow'itch, **Cowhage** or **Cow'age**, the hairs of the pods of certain leguminous plants which grow in the East and West Indies. The hairs are stiff and brittle, with finely serrated tips, which enables them easily to penetrate the skin, where they produce an intolerable itching. They are employed medicinally.

Cow'ley, ABRAHAM (1618-1667), an English poet of great celebrity in his day, born in London. He was educated at Saint John's College, Oxford. He engaged actively in the royal cause, and when the queen was obliged to leave England Cowley accompanied her. For nearly ten years he was absent from his native country, and it was principally through him that the correspondence was maintained between the king and queen. Besides his epic, *Davideis*, and several elegies which are among his best work, he wrote numerous love poems, which to readers of the present day seem stilted and artificial.

Cow Par'snip, a large, coarse plant of the parsley family, that grows to a height of from three to six feet and bears handsome leaves and large clusters of small white flowers. Though rather striking in appearance, the cow parsnip becomes a troublesome weed if allowed to grow in damp soil near the water. There are a number of different species, but none of them is especially valuable, though one or two are used for fodder or as a substitute for celery.

Cow'pens, BATTLE OF THE, a battle of the American Revolution, fought in Spartansburg co., S. C., near King's Mountain, January 17, 1781. The English force of 1100 under Tarleton was opposed by a thousand Americans under Morgan and other partisan leaders. The British army was attacked on both flanks simultaneously, and the whole force, with the exception of 270, was captured or killed. The Americans lost but 12 killed and 61 wounded.

Cow'per, WILLIAM (1731-1800), an English poet. He lost his mother when he was but six and was placed at a school in Hertfordshire, from which, on account of rough treatment from one of his schoolmates, he was removed when ten years of age. He left Westminster School at eighteen, with a fair reputation for classical learning and with a horror of the school discipline which he afterward expressed in his *Tirocinium*. He was then apprenticed for three years to a solicitor, and at the expiration of his service he took chambers in the Middle Temple. In 1754 he was called to the bar. The interest of his family procured for him the post of clerk to the House of Lords; but having to appear for examination at the bar of the House, his nervousness was such that on the very day appointed for the examination he resigned the office and even attempted suicide. Soon afterward he became insane, and from December, 1763, to June, 1765, he remained under the care of Doctor Cotton at Saint Albans. The skill and humanity of that gentleman restored him to health, and he went to live in Huntingdon. Here he became acquainted with Mr. and Mrs. Unwin, in whose house he lived for some time. When Mr. Unwin died, Mrs. Unwin moved with Cowper to Olney, and here she carefully tended him through a second attack of his malady. In 1776 he commenced a poem on the *Progress of Error*, which he followed by three other poems, *Truth*, *Table Talk* and *Expostulation*. These, with some others, were published in a volume in 1782. One of his friends, Lady Austen, suggested *The Task*, which on its publication in 1785 made Cowper famous. It had a real effect in helping to bring into poetry a spontaneity and a feeling for natural beauty, in contrast to the artificiality of most of the poetry of the eighteenth century. *The Diverting History of John Gilpin*, by which Cowper is perhaps best known, is also due to the suggestion of Lady Austen. The translation of *Homer*, begun in 1784, occupied him for the next six years, and was published in 1791. He removed during its

progress from Olney to Weston. In the beginning of 1794 he was again attacked with insanity. The revision of his *Homer* and the composition of some short pieces occupied the latter years of his life.

Cow'pox, a disease which appears on the teats of the cow, in the form of eruptions. This is the same disease as smallpox in man, and the fluid from cowpox eruptions injected into human beings gives them a mild form of the disease and protects them from its virulent forms. See VACCINATION; SMALLPOX.

Cow'rie or **Cow'ry**, the shell of a small mollusk, which in some parts of Africa and in many parts of southern Asia is used for coin. The beauty of these shells has given them a place among ornaments, and both civilized and uncivilized nations have always used them. The shells which are used as currency are found principally in the Philippine Islands, and they vary in value in different localities.

Cow'slip. In England this name is given to the primrose, a pretty little herb found in pastures and meadows. It has a cluster of buff-yellow, scented flowers, in the midst of a rosette of spreading leaves. In the United States the marsh marigold, a large yellow-flowered plant of the buttercup family, is called cowslip. This grows in swampy places, and in early spring its leaves and stems are often gathered for greens. The flowers are a bright yellow. The beautiful plant of the primrose family, known in the western states as the shooting star, is called the American cowslip, while the Virginian cowslip belongs to the borage family and is known as the bluebell, or lungwort.

Cow Tree, a name of various trees having an abundance of milky juice; especially, of a South American tree, which, when wounded, yields a rich, milky, nutritious juice in such abundance as to render it an important article of food. This fluid resembles in appearance and quality the milk of a cow. The tree, which is common in Venezuela, grows to the height of 100 feet. The leaves are leathery, about one foot long and three or four inches broad.

Cox, DAVID (1783-1859), an English landscape painter, the greatest English water-colorist, born in Birmingham. His works are chiefly of English and Welsh scenery. Cox was the most important of the followers of Constable and almost equaled that painter. His works show attention to general effects and neglect of small details. He is especially praised for his treatment of light and shade and for his

Cox

skill in colors. Among the best specimens of his art are *Hay Field*, *Bolton Abbey* and *Peace or War*.

Cox, KENYON (1856-), an American painter, born in Warren, Ohio. After studying in the United States he went to Paris, where he continued his study under the instruction of Carolus Duran and Gérôme. Among his best pictures are a portrait of the sculptor Augustus Saint Gaudens and *An Eclogue*. Examples of his work in mural decoration are to be seen in the Congressional Library in Washington and at Bowdoin College.

Cox, PALMER (1840-), an American artist and author, born in Quebec. He lived for some time in California and began his literary work with contributions to the *Golden Era* and other western papers, but in 1875 he moved to New York City. He is especially known by his drawings and his verses of the Brownies.

Cox, SAMUEL SULLIVAN (1824-1889), an American statesman and author, born in Zanesville, Ohio. He graduated from Brown University, entered the law, then became a journalist, and removed to New York City in 1866. Two years later he was elected to Congress and served until 1882. In 1885 he was appointed minister to Turkey, resigned the following year, and in November, 1886, again became congressman. He was the author of a very valuable work, *Three Decades of Federal Legislation* (1855-1885).

Coxe, ARTHUR CLEVELAND (1818-1896), an American Protestant Episcopal bishop, born at Mendham, N. J., and educated at the University of New York and the General Theological Seminary. After completing his education he became rector at Hartford, Conn., at Baltimore, Md., and in New York City. In 1865 he was appointed bishop of Western New York. He was the founder of the Christian Literature Company and edited numerous theological and other works which they published. Bishop Coxe was a prolific writer, both in prose and poetry. Among his best-known works are *Christian Ballads*; *Apollos, or the Way of God*, and *The Institutes of Christian History*.

Coxey's Army, a band of laboring men organized through the efforts of an agitator, Jacob S. Coxey, of Ohio, in 1894. The so-called army, known as the Commonweal Army, consisted of 336 men. It marched to Washington and there attempted to impress the government with the necessity of heeding the demands of labor, but its leader was arrested upon a trivial

Crab

charge and lodged in jail. His followers soon dispersed.

Coyote, *ki'ote* or *li'ot e*, the American prairie wolf. It is the American representative of the old world jackal. It is about forty inches long.



COYOTE

with a tail about eighteen inches long. The voice is a kind of snapping bark, whence the name of barking wolf.

Crab, a popular name for a large group of small animals, of which there are about one thousand species. The head and breast are united, and the whole is covered with a strong shell. The mouth has several pairs of strong jaws, in addition to which the stomach has its internal surface studded with hard projections for the purpose of grinding the food. The liver is the soft, rich, yellow substance usually called the *fat* of the crab. The young crabs throw off their covering at intervals as they increase in size, but after they are full-grown, three or four years at least may pass without a change of this character. The first pair of limbs are not used for locomotion, but are furnished with strong claws or pincers, and the right claw is generally larger than the left. The crab's eyes are compound and are placed upon stalks, which sometimes are over an inch in length. Crabs generally live on decaying animal matter, though some live on vegetable substances, as the *racers crabs* of the West Indies, which suck the juice of the sugar cane. Crabs inhabit both sea water and fresh water; some live on the land, only going to the sea to spawn. Several species are highly esteemed as food, notably the *blue crab* of the eastern United States, and the *great or edible crab* of Europe, and fishing for them constitutes an important industry on many coasts. See CRAWFISH; HERMIT CRAB; HORSESHOE CRAB; FIDDLER CRAB.

Crabbe

Crabbe, *krab*, GEORGE (1754-1832), an English poet. His poems are all characterized by homely truthfulness, simplicity and pathos, and they were highly praised by Johnson, Scott, Wordsworth and Byron. Best known of them is *The Village*.

Cracow or **Kracow**, *kra'ko*, the ancient capital of Poland, now belonging to Austria, situated on the left bank of the Vistula, 158 mi. s. w. of Warsaw. It was the capital of Poland from 1320 until the beginning of the seventeenth century, when it was displaced by Warsaw. Among the principal buildings are a Gothic cathedral, erected under Casimir the Great in the fourteenth century; Saint Mary's Church; a royal castle, now used as a barracks, a university, founded by Casimir the Great, and a royal academy of science. On a hill near the town stands the monument to Kosciusko, 120 feet high. The manufactures are leather, chemicals and machinery, and the chief trade is in grain, salt and animals. Population in 1910, 151,886.

Crad'dock, CHARLES EGBERT. See MURFREE, MARY NOAILLES.

Craigie, *kra'ge*, PEARL RICHARDS (1867-1906), an English novelist, better known by her pen name of John Oliver Hobbes. She was born in Boston, but was taken to England in her youth. In 1887 she was married to Reginald W. Craigie, from whom, eight years later, she secured a divorce. Among her writings are *The Gods, Some Mortals and Lord Wickenham; Robert Orange; The Serious Wooing; Love and the Soul Hunters*, and several plays, best known of which is *Journeys End in Lovers' Meeting*, written for Ellen Terry.

Craik, DINAH MARIA MULOCK (1826-1887), an English novelist, known chiefly for her story *John Halifax, Gentleman*, which has always been very popular and has been widely translated. Among her less generally known novels are *The Ogilvies, Olive, A Life for a Life and Mistress and Maid*.

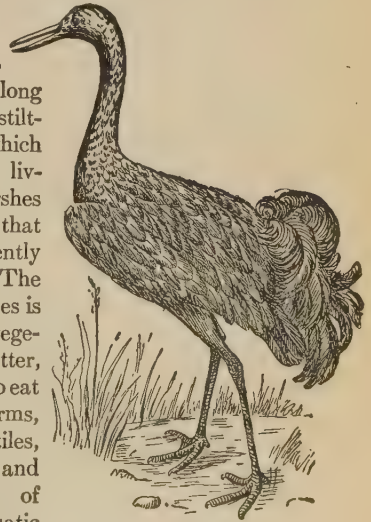
Crake'berry. See CROWBERRY.

Cran'berry, a native fruit of northern Asia, Europe and North America. It is also called *moss berry* or *moor berry*, as it grows only on peat bogs or swampy land, usually among masses of sphagnum. The berry, when ripe, is globose and dark red and is a little more than a quarter of an inch in diameter. The American cranberry, a native of the United States and Canada, has larger berries than the European species and is extensively cultivated in some localities. It thrives best in swampy lands.

Crane

Crane, a machine for raising and moving heavy weights. The most common form of crane is the ordinary derrick (See DERRICK). The power may be applied to a crank by hand, or to a train of wheelwork by a steam engine or an electric motor. The hoisting engine is in ordinary use for furnishing power for cranes of this sort, where buildings or other structures are being erected. The weight is hoisted by winding a rope or cable around a cylinder. In shipyards, steel mills, locomotive works and other places where heavy weights have to be moved from one part of the yard or factory to another, the traveling crane is employed. This consists of a hoisting device similar to that used on the ordinary crane, with the exception that no jib is used. This device is mounted on a traveling table, which runs on rails supported on the opposite sides of the building, or on a trestle constructed for the purpose. These cranes are usually operated by electric motors. One motor operates the hoisting machinery, and another operates the machinery by which the crane is moved over the track. Cranes of this pattern are constructed with sufficient power to lift an entire locomotive and carry it from one part of the factory to another, where it is set down as carefully as though it weighed but a few pounds.

Crane, the common name of a number of different species of wading birds, generally of rather large size and remarkable for their long necks and stilt-like legs, which fit them for living in marshes and lands that are frequently overflowed. The food of cranes is partly of vegetable matter, but they also eat insects, worms, frogs, reptiles, small fish and the spawn of various aquatic animals. They nest among the bushes or in the marshes and lay but two eggs. The cranes spend their summers in the north temperate regions, but on the approach



CRANE

of winter they make exceedingly long migrations to the south. They feed chiefly in the early part of the day and spend the rest of the time often dozing, standing on one leg, with the head drawn back on the shoulders. Some species are easily domesticated and are regarded as sacred in parts of Japan and India. Some species carry beautiful crests of long, slender feathers, and most of them are noted for the peculiar dances and antics through which they go during their courtships. The *demoiselle crane*, found in Central Asia and in winter in Africa, is especially noted for its graceful performances. In the United States there are three species, the *whooping crane* being the largest. The windpipe of this crane is coiled at the lower end into the crevices of the breast bone and is sometimes eight feet in length. This accounts for the peculiar resonance of the bird's cry.

Crane, STEPHEN (1870-1900), an American novelist, born in Newark, N. J. He studied at Lafayette College and Syracuse University and then began newspaper work. While thus engaged, he wrote and published, at his own expense, *Maggie, a Girl of the Streets*, a realistic novel of street and slum life. *The Red Badge of Courage*, which eventually came into notoriety, was written before the author attained his majority. The story deals with a raw recruit in battle, and his first fear on confronting the foe and hearing the whistle of shot and shell are described in a most vivid manner. He was able to describe the battle scenes and tactical evolutions in such a way as to deceive the critics, who declared that such descriptions could only have been written by an old veteran. Among his other books are *The Little Regiment*, *On Active Service* and *Whilomville Stories*.

Crane, WALTER (1845-), an English painter and engraver, born in Liverpool. Among his works are *Birth of Venus*, *The Fate of Proserpina*, *Plato's Garden*, *Date Trees on Monte Pincio* and *End of the Year*. Crane is specially known by his drawings in juvenile subjects, among which are *Echoes from Hellas*, *Flora's Feast* and *Queen Summer*. He has also done designing for glass windows, tapestries and the like and has written on various subjects.

Crane, WINTHROP MURRAY (1853-), an American manufacturer and politician, born at Dalton, Mass. After receiving a public school education, he engaged in the manufacture of paper. He was Republican lieutenant governor of Massachusetts from 1897 to 1899, was elected governor in 1903 and was chosen United States

senator to succeed Senator Hoar in 1904. He served until 1913.

Cra'nial Nerves, the nerves which originate at the base of the brain and pass directly from these centers to the various organs of the head and face and the upper part of the thorax. In structure the cranial nerves are more simple than the spinal nerves, and in function they include both sensory and motor nerves. They are arranged in 12 pairs. The first pair is the nerve of smell (See SMELL). The second pair contains the optic nerves, or nerves of sight (See EYE; VISION). The third pair has nerve fibers distributed to the muscles of the eyeball, and, together with those of the fourth and sixth pairs, these nerves produce all the movements of the eye, including those of the iris and the eyelids. The fifth pair has two roots, containing both sensory and motor nerves. This pair divides into three branches, the first sending fibers to the mucous membrane of the nostrils and the muscles of the skin of the forehead and upper eyelid, the second sending branches to the lower eyelid, the skin of the nose, temples, cheeks, upper lip, palate and the teeth of the upper jaw; the third divides into three branches and is distributed to the side of the head, the external ear, the skin of the lower part of the face, the mucous membrane of the mouth, the tip of the tongue and the teeth and the muscles of the salivary glands of the lower jaw. The nerves of the seventh pair are distributed to the muscles of the face and are composed almost entirely of motor fibers, which control the muscles of expression. This nerve is sometimes called the nerve of expression. The eighth pair is the nerve of hearing (See EAR). The ninth pair contains sensory and motor nerves, and some of its fibers constitute the nerves of taste, while others extend to the muscles of the pharynx and the mucous membrane at the back of the nose and pharynx. Another branch controls the secretions of the parotid glands.

The tenth pair, generally known as the *pneumogastric* nerve, has the longest and most widely distributed trunks. The nerves are both motor and sensory, and the branches extend to the pharynx, esophagus, larynx, windpipe, lungs, heart, stomach and intestines, and probably to the liver and the kidneys. The motor fibers of this nerve control all muscles of these organs. The fibers extending to the heart have an inhibitory function, and those extending to the lungs control respiration. The eleventh pair controls the movements connected with swallow-

ing and the respiratory movements associated with any effort. The twelfth pair are distributed to the muscles of the tongue and control its movements in swallowing and in speech.

Cran'mer, THOMAS (1489-1556), archbishop of Canterbury, famous for the part he played in the English reformation during the reign of Henry VIII. He was born at Aslocton. In January, 1533, he was appointed archbishop of Canterbury. He zealously promoted the cause of the Reformation; through him the Bible was translated and read in churches, and monastic institutions were vigorously suppressed. Henry VIII appointed him by will one of the Council of Regency to Edward VI. By the will of Edward VI, his sister Mary was excluded from the crown, and Cranmer upheld the cause of Lady Jane Grey. With others who had been most active in Lady Jane's favor, he was sent to the Tower when Mary ascended the throne. He was tried on charge of treason and condemned to die, but was not executed on that sentence. In 1554, with Latimer and Ridley, he was removed to the common jail on the charge of heresy. Cranmer signed several recantations, but he finally said he would retract all his hand had written in fear of death. He was burned at the stake, and when the fire was lighted he thrust his hand into it, saying, "This hath offended: Oh, this unworthy hand!"

Cran'ston, R. I., a town in Providence co., on the New York, New Haven & Hartford railroad. It is a residence place near Providence, of which it was a part until 1754. There are breweries, vegetable gardens and manufactures of cotton goods and wire. The town has four village libraries, state reform schools for boys and girls, a state prison, an almshouse, an insane asylum and a workhouse. Population in 1910, 21,107.

Crape or **Crêpe**, a crinkled, wiry, transparent stuff, made of raw silk, well twisted and gummed, and commonly dyed black, to be used for mourning garments. It is manufactured in Italy, England and France. China crape, or *crêpe de chine*, is a soft, white or colored silk fabric, of gauzy texture and wavy appearance, used for ladies scarfs, shawls, hat trimmings and evening dresses.

Cras'sus, MARCUS LICINIUS (114-53 B. C.), a Roman triumvir, surnamed *Dives* (the rich). He took part with Sulla in the civil war, and as praetor in 71 B. C. he defeated Spartacus and the revolted slaves at Rhégium. In 70 he was elected consul, with Pompey as his colleague,

but the two shortly came into conflict and were not reconciled until 60 B. C., when Caesar induced them to form with him the first triumvirate. Five years later Crassus again became consul, and, obtaining Syria for his province, he made war on the Parthians, but was defeated and slain.

Cravat', a neckcloth, or necktie, worn about the collar. The cravat in its modern form first came into use when the Croats, called Cravates by the French, entered the French service in the seventeenth century, wearing this piece of dress. The fashion soon spread, and cravats were worn by the soldiers and officers, the former wearing common cloth or cotton, and the latter, elaborate and embroidered cravats. Toward the end of the eighteenth century and the beginning of the nineteenth, the fashion was very extravagant, but changed when the simple necktie was introduced, which style has since prevailed.

Craw'fish or **Cray'fish**, a name of various crustaceans. In structure they are very like the lobster, and the young are carried under the broad tail of the mother in the same way as the lobsters. The crawfish inhabits the fresh waters of the United States, Europe and the north of Asia, and is common in some of the streams of England, where it is considered an excellent article of food. It lurks under stones or in holes in the banks. Its food consists of small mollusks or fishes, the larvae of insects and almost any sort of animal matter. Some crawfish, by their burrowing habits, injure milldams and levees. About thirty species are known in America, where they are often called crabs.



CRAWFISH

Craw'ford, FRANCIS MARION (1854-1909), an American novelist. He received his education at Concord, New Hampshire, in Trinity College, Cambridge, and at Karlsruhe and Heidelberg. At Rome he devoted himself to the study of Sanskrit, and during 1879 and 1880 was engaged in press work at Allahabad, where he was admitted to the Catholic Church. He was selected by the government committee to write the national ode at the centennial of the American Constitution, Sept. 17, 1887. His first novel, *Mr. Isaacs* (1882), was a book of

striking and quite unusual merit and at once won for its author popularity. The rich romantic elements in certain of the aspects and contrasts of modern Oriental life were a distinct discovery to worked-out novelists. Among its successors are *Dr. Claudius*, *A Roman Singer*, *Zoroaster*, *The Story of a Lonely Parish*, *Saracinesca*, *The Witch of Prague*, *Paul Patoff*, *Don Orsino* and *Sant' Ilario*. Mr. Crawford possesses imagination, originality and vigor, with a graceful and vivid style and remarkable power of description.

Crawford, THOMAS (1814-1857), an American sculptor, born in New York. He studied in Rome and became the pupil of Thorwaldsen. His best known works comprise *Orpheus and Cerberus*, *Adam and Eve*, *Hebe and Ganymede*, *Mercury and Psyche* and *The Indian*. He executed important works for the National government and for the State of Virginia, among which is a statue of *Liberty* in the Capitol in Washington.

Crawford, WILLIAM HARRIS (1772-1834), an American statesman, born in Nelson co., Va. He removed to Georgia, was admitted to the bar in 1798 and in 1800 was appointed to revise the laws of Georgia. He was elected to the legislature in 1802 and in 1806 to the United States Senate. In 1813 he declined the office of secretary of war in President Madison's cabinet and was appointed minister to France. He returned to this country two years later and was made secretary of war and then secretary of the treasury, serving through both terms of Monroe's administration. In the presidential contest of 1824, Crawford was a prominent candidate, being one of three from whom the House of Representatives was to choose (since no candidate had a majority of electoral votes). A stroke of paralysis at about this time ruined his chances of election. He was made judge of the northern circuit of Georgia in 1827, which office he held until his death.

Crawfordsville, IND., the county-seat of Montgomery co., 40 mi. n. w. of Indianapolis, on the Sugar Creek, and on the Terre Haute & Indianapolis, the Big Four and other railroads. The manufactures of the city include wagons, flour, and lumber and foundry products. It is the seat of Wabash College and contains a fine county courthouse. The place was settled in 1822 and was incorporated as a city in 1865. Population in 1910, 9371.

Cray'fish. See CRAWFISH.

Cray'ons, colored pencils obtained from certain mineral substances in their natural

state, but more commonly manufactured from a fine paste of chalk or pipe clay, colored with various pigments. Crayons used in lithography are commonly made of a mixture of wax, soap, resin and lampblack. Colored crayons are made by mixing pigments with the chalk. Black crayons are made of the finest quality of charcoal. A kind of *crayon painting* is practiced to some extent, the coloring matter in a soft state being rubbed on with the finger. Its chief advantages consist in the facility of its execution and the soft beauty and richness of the coloring.

Creamery, *kream'ur y*, or **Butter Factory**, a factory where butter is made. Creameries are organized on three plans: by the association of farmers of the neighborhood, who build and operate the creamery and share proportionally in its profits; by the formation of a stock company, in which the stockholders are patrons, and by individuals, who build the creamery, buy the milk and sell the butter. The last plan is being rapidly extended throughout the country. Creameries gather both cream and milk and pay for each according to the amount of butter fat it contains, this being determined by a milk or cream tester. The by-product of the creamery is skim milk, most of which is returned to the patrons or is sold. It is taken to the farms and fed to calves or pigs. Dried curd, or casein, is also made from it and is of some commercial importance.

A well-equipped creamery contains apparatus for testing the milk and cream, a tank for receiving the milk, another for holding the cream and a third for the skim milk. The machinery consists of a motor, which is usually a gas engine, the cream separator, churns and butter works. An average-sized creamery will use from 8000 to 10,000 pounds of milk in a day, and some of the largest have a capacity for making fifteen tons of butter every twenty-four hours. Creameries are in charge of skilled butter-makers, who have usually learned their trade at agricultural experiment stations or agricultural colleges. See BUTTER; DAIRYING; MILK.

Cream of Tar'tar or **Potas'sium Bitar'trate** exists in grapes, tamarinds and other foods. It is prepared from the crystalline crust called *argol*, deposited on the vessels in which grape juice has been fermented. The argol is dissolved by boiling with water, the mixture is filtered and the cream of tartar is allowed to crystallize. The commercial product usually

contains a small percentage of calcium tartrate. It is frequently employed in medicine, in dyeing wool, to fix colors and as a part of baking powder.

Creasy, *kre'sy*, EDWARD SHEPHERD, SIR (1812-1878), an English historian. In 1840 he was appointed professor of history at the London University, and in 1860 he was made chief justice of Ceylon, receiving at the same time the honor of knighthood. His principal work is *Fifteen Decisive Battles of the World*.

Crecy, *kra se'*, a town of France, about 100 mi. n. of Paris, celebrated for the victory gained there by Edward III over a French army under Philip VI, August 26, 1346. About 300,000 of the French army were slain, including King John of Bohemia and many of the nobles. The motto *Ich dien* (I serve), which is borne by the Prince of Wales, and the three feathers of his crest, are those of King John. These were adopted by the Black Prince, son of Edward III, after the battle. Population, about 1500.

Cred'it, in economics, generally speaking, the confidence existing between the creditor and his debtors, by which the payment of amounts due to him is postponed. This confidence may be based on either or both of two factors, trust in the honor and ability of the debtor, or security deposited by him to assure the payment of the debt. A common example of the former kind of credit is that of the so-called *trust* or *book accounts* of retail merchants. Credit transactions of the latter kind are usually evidenced by a so-called instrument of credit—that is, a note, bill, mortgage or bond. Transactions of this latter kind have become common in business, for when a debt is evidenced by a written instrument, the account can be transferred from one party to another, and money can be raised immediately, even before the debt is due. The development of the credit system in business is of comparatively recent date, and its growth has been favored by several movements, namely, the general raising of moral standards incident to advancing civilization, and the gradual increase in the rigidity of business law, through statutes and judicial interpretation, always toward the greater security of the creditor. The credit system to-day underlies a vast majority of commercial transactions. Its advantage lies in the fact that by obviating the use of actual money in many instances, it frees for investment and other commercial purposes funds which otherwise would have to be held for use in minor affairs.

It is in this way that modern banks have become such an important part of the industrial system. By collecting wealth which has been lying idle in the hands of a great number of persons who are either unwilling or unable to make loans, they make possible transactions of much greater importance, with saving of time, trouble and expense.

The term *public credit* signifies the confidence which men feel in the ability and disposition of a nation to pay its debts. The credit of an individual or firm refers to the reputation for meeting obligations; so the credit of a bank depends upon the degree of confidence which the community places in its ability to redeem its notes. See BANKS AND BANKING.

Credit, LETTER OF, an order given by bankers or others at one place, to enable a person to receive money from their agents at another place. It differs from the common *check* or *draft*, in containing a statement, not of the exact amount to be paid, but of an amount which the payment shall not exceed. It may contain coupons, each of which calls for a certain amount, in which case it is sometimes called a *traveler's note*. If it names several banks which shall honor drafts, it is known as a *circular letter of credit*, and in this form it is much used by travelers.

Credit Mobil'ier. In 1852 the French government sanctioned the foundation of a new bank, under the name of the *Societe Generale de Credit Mobilier*, whose object was to assist all kinds of industrial enterprises through loans upon their personal or movable property. It was allowed to acquire shares in public companies and to pay the calls made upon it, through such investments, by its own obligations (or bonds). The operations of the society were conducted upon a very extensive scale. In 1854 it subscribed largely to the government loan on account of the Russian War and to various other important public undertakings. In 1855 it loaned two sums to the government—one of 250,000,000 francs and another of 375,000,000. Its dividends in this year amounted to 40 per cent. The public became alarmed so that, in 1856, the French government deemed it necessary to prohibit the carrying out of certain proposed schemes. Thereafter the institution rapidly declined; it was reorganized in 1871, but never regained its former influence.

The title *Credit Mobilier of America* was adopted by a joint stock company organized

in Pennsylvania in 1863, with a capital of \$2,500,000. In 1867 the charter was purchased by a company organized for the construction of the Union Pacific railroad, and in 1872 it became known that several members of Congress, as well as the vice-president, were secret stockholders. This fact, together with the enormous rights and profits connected with the company, led to a congressional investigation, which developed a huge attempt at bribery and corruption. It was charged that several leading advocates of the plan had been bribed by donations of large blocks of shares in return for their influence. As a result, resolutions of censure were passed by Congress, and one member was sentenced to expulsion, but the sentence was never carried out. The scandal, after a time, died away, and the road proposed was finally built and is now in operation. See PACIFIC RAILROADS.

Cree, once one of the largest and strongest of the Algonquian tribes, whose home lay chiefly in British America, but who often came into the United States from Lake Winnebago and westward. About 10,000 now remain on Canadian reservations.

Creed, a summary of the articles of Christian faith. The Apostles', the Nicene, the Chalcedonian and the Athanasian may be said to form the great Catholic creeds of the Church. The Apostles' Creed is so called from the belief that it originated with the Apostles themselves. The present text dates from the year 500, but evidently depends upon an earlier form, which may be traced back to about 150 A.D. The Nicene, the next oldest creed in the history of the Church, was adopted by the Council of Nice, 325 A.D., to settle the controversy concerning the dignity and character of Christ, and its essence is the expression of the belief that "Christ is of the *same* substance with the Father." The Creed of Constantinople, which supplements the Nicene, emphasizes in particular the divinity of the Holy Ghost. The Athanasian Creed, dating from about the sixth century, is so called because it embodies particularly the Catholic doctrines of the Holy Trinity and the incarnation of the Son of God, which were so ably upheld by Saint Athanasius. These creeds were later supplemented by the Councils of Trent and of the Vatican. Besides these great creeds, the various Protestant churches have their confessions of faith, which give a more detailed statement of their doctrines. Thus, the Lutheran Church has the *Symbolic*

Book of the Evangelical Church; the Church of England, the *Thirty-nine Articles*, and the Presbyterians, the *Westminster Confession of Faith*, which is one of the most elaborate of all creeds and grew out of the Puritan agitation of the seventeenth century. Other modern church creeds are chiefly modifications or revisions of these, many differing but slightly in essential features.

Creeks, once the strongest Indian confederacy south of New York, excepting the Cherokee. They occupied a large portion of Georgia and Alabama and probably numbered 30,000. They built log houses in permanent villages. During the Revolution they sided with the English, and in the War of 1812 a part of them rose against the Americans and indulged in the terrible massacre at Fort Mims. In 1814, in a fierce battle at Horseshoe Bend, they were completely defeated. They stubbornly resisted every effort of the government to educate them and refused to give up their lands until they were forced to do so. They are now living in Oklahoma as the Creek Nation, and number about 8000 Indians, 7000 negroes and 25,000 Whites. See FIVE CIVILIZED TRIBES.

Creeper, a name given to almost any small bird that runs up and down the trunks of trees



BROWN CREEPER

looking for insects. The common brown creeper of the United States is a good example. It builds its nest usually in holes or in the crevices of trees, and it is remarkably active in its habits. It begins at the bottom of a tree and works rapidly up, searching all the crevices of the

bark. When it decides to leave the tree, it flies to the bottom of another and again works its way up, using its sharp-pointed tail feathers to push itself along.

Crema'tion, the burning of the bodies of the dead, a practice which was frequent in ancient times, instead of burial, and which has recently been advocated on hygienic grounds by many scientific men in Europe and America on account of the dangers to the living caused by the presence of graveyards and cemeteries. Various methods of cremation have been proposed; the great difficulty is to consume the body without permitting the escape of noxious exhalations, and without mingling the ashes with foreign substances. In Siemens's process, a modification of a plan of Sir Henry Thompson, this is successfully accomplished. Cremation societies have been instituted in every European country and in many states of the Union.

Cremona, *kra mo'na*, a city of Italy, capital of a province of the same name, 48 mi. s. e. of Milan, on the left bank of the Po River. The most remarkable building is the cathedral, begun in 1107 and finished in 1492. Near by, connected with the cathedral, is the Torazzo, one of the loftiest and most beautiful towers in Italy. Cremona has now a number of successful manufacturing of silk, earthenware and, especially, of mustard. The city is especially famous as being the residence of the Amati family and of Stradivarius, who for more than a hundred years were the makers of excellent violins. Population in 1911, 40,436.

Creole, *kre'ole*, the name which was originally given to all the descendents of Spaniards or Frenchmen born in the southern part of the United States and in the West Indies. The term is sometimes incorrectly applied to a mulatto.

Cre'osote, a substance discovered by Reich- enbach in 1832 in wood tar, from which it is separated by a tedious process. It is generally obtained, however, from the products of the destructive distillation of wood. In a pure state it is oily, heavy, colorless, has a sweetish, burning taste and a strong smell of peat smoke or smoked meat. It is a powerful antiseptic. Wood treated with it is not subject to dry rot or other disease. It has been used in surgery and medicine with great success.

Crêpe, *krape*. See **CRAPE**.

Crescent, *kres'sent*, a representation of the moon in her horned state, used by the ancient Egyptians and the Greeks as the symbol of their

moon goddesses. It was the emblem of the old city of Byzantium, and was adopted by the Turks when they captured Constantinople in 1453. Since the establishment of the Turks in Europe, it has been the universal emblem of their Empire. A Turkish order of knighthood, instituted by Selim, sultan of Turkey, in 1799, was known as the Order of the Crescent.

Crescent City, a name given to the city of New Orleans, because formerly the greater part of it lay in a great bend of the Mississippi River.

Cress, the name of several species of plants, most of them of the mustard family. Water-cress makes a delicious salad, as its leaves have a moderately pungent taste. It grows in cool springs and rivulets.

Crest, in ancient armor, the plume or tuft of feathers affixed to the top of the helmet. In heraldry the crest is a figure originally intended to represent the ornament of the helmet, but it is now generally placed upon a wreath, coronet or cap of maintenance, above both helmet and shield. The crest is considered a greater criterion of nobility than the coat of arms itself.

Cres'ton, IOWA, the county-seat of Union co., 70 mi. s. w. of Des Moines, on the Chicago, Burlington & Quincy Railroad. The industries of the city include machine shops, car works and wagon factories. It was settled in 1868 and was incorporated the next year. Population in 1910, 6924.

Cres'wick, THOMAS (1811-1869), an English landscape painter. His first pictures were admitted into the Academy exhibition when he was only in his seventeenth year, and his success was afterward continuous. Among his great works are *London Road a Hundred Years Ago*, *Weald of Kent* and *Welsh Glen*.

Cretaceous, *kre ta'shuus*, **System** or **Chalk System**, a system of rocks between the Jurassic, below, and the Tertiary, above, and the oldest system of the Mesozoic era. It takes its name from the chalk beds which form a prominent feature of it in England and France, but the chalk formations constitute only a small portion of the system. In North American cretaceous rocks are numerous and extend over large areas, following the Atlantic coast from New Jersey to Florida, and the gulf coast from Florida to Texas, then extending up the Mississippi Valley to the mouth of the Ohio. They also form extensive areas in the great plains along the Rocky Mountains, extending northward as far as the mouth of the Mackenzie River and south-

ward into Mexico. On the Pacific coast the rocks of the system appear at numerous points from California to British Columbia. The fossils show a great variety of animal and vegetable life. Among the animals were flying reptiles, birds with teeth, large sea serpents and land reptiles of great size. The plants show that trees similar to the oak, birch and poplar existed. See JURASSIC SYSTEM; TERTIARY PERIOD.

Crete or **Can'dia**, an important island in the Mediterranean, belonging since December, 1913, to Greece. It is 156 miles long, is from 7 to 30 miles wide and has an area of 3330 square miles. High mountains, covered with forests, run through the whole length of the island. On the north the island declines moderately to a fertile coast, provided with good harbors; on the south side it descends steeply to a rocky shore, with few roadsteads; and it reaches its greatest height in Mount Ida, 7670 feet high, always covered with snow. Numerous springs give fertility to most of the valleys in which, and on the declivities of the mountains, is seen a luxurious vegetation. The island produces grain, wine and oil, wool, flax, silk and cotton, fish, honey, game, cattle, fruits and even metal in abundance. Manufactures, trade and navigation are insignificant. Most of the harbors are silted up. The principal ports are Candia, the capital, Retimo and Khania.

The early history of Crete is lost in the fables of Greek mythology, in which Saturn, Zeus and Minos are spoken of as among its kings. At one time a republic, it was the seat of the Cilician pirates till conquered by the Romans, from whose hands it passed in 823 to the Saracens and then to the Greeks again in 962. In 1204 the Byzantine sovereign sold it to the Venetians, who held it until the second half of the seventeenth century, when the Turks conquered it after a desperate struggle, ending in a siege of the capital lasting for no less than twenty years. Insurrections against Turkish rule have more than once occurred; a formidable one, fomented by Greece in 1868, was with difficulty suppressed after a long conflict. There have been many revolts and uprisings in the last fifty years, due to the discontent under the rule of the sultan. In 1898 Prince George of Greece was made High Commissioner, with a guarantee of autonomy by Great Britain, Russia, France and Italy; after the Turko-Balkan War the island was formally annexed to Greece. The inhabitants, about 1,200,000 in ancient

times, now number about 310,000, of whom 275,000 are Christians, mostly of Greek descent.

Crib'bage, a favorite game at cards, played with the whole pack. It may be played by two, three or four persons; and when by two five or six cards may be dealt to each. Five-card cribbage played by two persons is the most scientific game. Sixty-one points make the game; there are no tricks and no trumps, the object being to make *pairs*, *fifteens*, *sequences* or the *go*, or to prevent the adversary from doing the same. Court cards and tens count as 10 each, and all the rest count for the number of spots upon them. Every *pair*, that is, every couple of cards of the same value belonging to different suits (two aces, two fours, two kings), counts 2; and when there are three or four similar cards, as many pairs are counted as there are different combinations of the cards, taken two at a time. Every combination of cards, the united spots of which make up fifteen, counts 2. A sequence consists of three or more cards of any suit following one another in rank, and counts 1 for each card. When the player whose turn it is to play cannot play a card without going beyond thirty-one, the other player scores 1 for having been the nearest to thirty-one. This is called scoring 1 for the *go*. The last card played in any hand counts 1, also. When all the cards in a hand, either with or without the turn up card, are of one suit, or when all the cards in the crib, with the turn up card, are of one suit, it is called a *flush* and counts 1 for each card. When the turn up card is a knave the dealer scores 2 for *his heels*. When a knave of the same suit with the turn up card is found in the hand of either player, the player in whose hand it is scores 1 for *his nob*. The counting is usually kept on a regular *board*, by means of two pins for each player. In the board are two sets of 30 holes, in groups of five, and as the game progresses the pins are moved forward. Twice around the board and into the *home* hole makes the game.

Crichton, *kri'tan*, JAMES (1560-1585), called *The Admirable Crichton*, a Scottish celebrity, son of Robert Crichton, lord advocate. Before he was twenty he had perfected himself in almost all the knowledge of his time, and he visited Paris, Genoa, Venice, Padua and Mantua, challenging all scholars to learned disputations, vanquishing doctors of the universities and disarming the most famous swordsmen of the time in fencing. He was latterly tutor to a son of the duke of Mantua, and is said to have

Cricket

been stabbed to the heart in a dastardly manner by his pupil.

Crick'et, a little insect about an inch long, of a blackish or brownish color, common in houses and cultivated gardens. By rubbing together its peculiarly formed wing covers, the male can produce the pleasant chirping sound by which these insects are so well known and which has become associated with cheerful fireside scenes. There are a number of different species, which differ in color and form from the common cricket. See MOLE CRICKET.

Cricket, the English national game, played with bats, balls and wickets on a piece of smooth greensward. It is played by two opposite sets or sides of players, generally numbering eleven



each. Two *wickets* of three *stumps* each are placed fronting each other at a distance of about 22 yards apart, the stumps being upright rods stuck in the ground, and projecting 27 inches. On the top of each set of stumps are placed two small pieces of wood, called *bails*. After the rival sides have tossed for the choice of either taking the bat or fielding, two men are sent to the wickets, bat in hand. The opposite or fielding side are all simultaneously engaged; one (the bowler) being stationed behind one wicket for the purpose of bowling his ball against the

Crimea

opposite wicket, where his coadjutor (the wicket keeper) stands ready to catch the ball should it pass near him; the other fielders are placed in such parts of the field as are judged most favorable for stopping the ball after it has been struck by the batsman or missed by the wicket keeper. It is the object of the batsman to prevent the ball delivered by the bowler reaching his wicket, either by merely stopping it with his bat or by driving it away to a distant part of the field. Should the ball be driven any distance, the two batsmen run across and exchange wickets, and continue to do so as long as there is no risk in being "run out," that is, of having the stumps struck by the ball while they are out of their position near the wickets. Each time the batsmen run between the wickets is counted as a "run" and is marked to the credit of the striker of the ball. If the batsman allows the ball to carry away a bail or a stump, if he knocks down any part of his own wicket, if any part of his person stops a ball that would have otherwise reached his wicket, or if he strikes a ball so that it is caught by one of the opposite party before it reaches the ground, he is "out;" that is, he gives up his bat to one of his own side; and so the game goes on until all the men on one side have played and been put out. This constitutes what is called an "innings." The other side now take the bat and try to defend their wickets and make runs as their rivals did. Generally after two innings each have been played by the contestants the game comes to an end, that side being the victors who have score the greatest number of runs.

Crime, a wrong committed against the state and in disobedience of its laws. It is thus distinguished from a civil offense, or *tort*, which is a personal injury. The common law formerly divided crimes into *treason*, which is the highest of all crimes, *felonies*, which were heinous offenses formerly punishable with death or forfeiture of property, and *misdemeanors*, which were minor offenses. Most states now define by statute what offenses constitute crime. To constitute a crime, an act must be done with criminal intent, but this is usually presumed when a sane man does an act which he knows to be a crime. See LAW; PROCEDURE; and the names of important crimes, as ROBBERY, MURDER.

Crime'a, a peninsula of southern Russia, between the Sea of Azov and the Black Sea, united to the mainland by the Isthmus of Perekop. It is about 200 miles long and 110

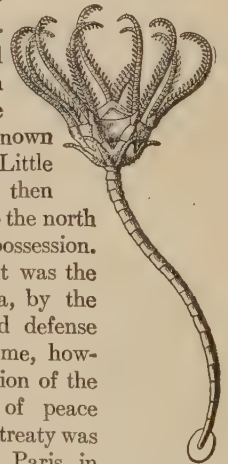
miles broad. Three-fourths of the Crimea belongs to the region of steppes, but the other part, confined entirely to the south and stretching along the coast from west to east, abounds in beautiful mountain scenery. Here the valleys are luxuriant with vines and olive and mulberry plantations, while the northern slope gives a large yield in cereals and fruits. The most important of the productions, besides those already mentioned, are flax, hemp and tobacco, of which a large quantity of excellent quality is produced. The forests are of limited extent. Fine-wooled sheep, horned cattle and horses are reared in large numbers. The chief town and port is Sebastopol. The country was anciently associated with the Cimmerians and in later times with various Greek settlements and minor kingdoms. After being for some time a dependency on Rome, it was overrun by barbarians, and in 1237 it fell into the hands of the Mongols, under Genghis Khan. About 1261 the Genoese were permitted to occupy and fortify Kaffa, and they rapidly extended their power in the formation of other settlements. They were expelled, however, in 1475 by Mahomet II, who made it a dependent khanate. In 1783 the Russians took possession of the country; and with the view of overawing the Turks the great naval arsenal of Sebastopol, occupying the most commanding position on the Black Sea, was begun by Catharine II in 1786. Its military resources were steadily developed up to the time of the Anglo-French campaign (See CRIMEAN WAR) of 1854, when it fell into the hands of the allies, by whom it was held until March, 1856. Population, 583,893.

Crimean War, the struggle caused by the attempt of the allied powers of England, France and Turkey to prevent the aggressions of Russia in Turkey. The old plans for the extension of Russian power conceived by Catharine II were revived by Nicholas I, who, believing that he had secured himself from interference on the part of Austria and Prussia, and that an Anglo-French alliance was impossible, prepared to carry them out. Servia, Bosnia, Bulgaria and the principalities of the Danube were to become protectorates, and Constantinople was to be provisionally occupied by Russian troops. However, the first markedly aggressive step, the demand by Russia for a protectorate over the Greek Church throughout the Turkish Empire, brought matters to a crisis. After a vain attempt to negotiate, the Russians occupied the Danubian principalities, and war was

declared by Turkey in October, 1853, by France and England in 1854 and by Sardinia in 1855. A French and English fleet entered the Baltic and captured Bomarsund, and in the south the allies landed at Varna, under Lord Raglan and Marshal Saint-Arnaud. While the allies were making preparations, Prussia and Austria demanded the evacuation of the Danubian principalities, and when evacuation was ordered by Nicholas, the principalities were provisionally occupied by the Austrians.

It soon became obvious that the Crimea must be the seat of the war, and the allied troops landed there in September, 1854. Five days after their arrival the Battle of Alma was won by the allies, and the march was then continued toward Sebastopol. Soon after this Saint-Arnaud died and was succeeded by Canrobert. The siege of Sebastopol was begun in October by a grand attack which proved a failure, and the Russians retaliated by attacking the English at Balaklava (October 25), but were defeated with heavy loss. It was at this battle that the famous, but useless, charge was made by the Light Brigade. A second attack at Inkermann was again repulsed by the allies, but the siege works made slow progress during the winter, during which the ill-supplied troops suffered great privations. The death of Nicholas and the succession of Alexander II, in March, 1855, brought no change of policy. Canrobert resigned in favor of Pélissier, and Lord Raglan died and was succeeded by Simpson. The bombardment was continued, and in September the French successfully stormed those parts of the fortifications known as the Malakoff and the Little Redan. The Russians then withdrew from the city to the north forts and the allies took possession. The chief subsequent event was the capture of Kars, in Asia, by the Russians, after a splendid defense by the Turks. By this time, however, the allies had possession of the Crimea, and overtures of peace were gladly accepted. A treaty was accordingly concluded at Paris in March, 1856, by which the independence of the Ottoman Empire was guaranteed.

Crinoid'ea or Sea Lilies, a group of animals, consisting of creatures which are attached during



ONE OF THE
LIVING
CRINOIDEA

Crinoline

the whole or a portion of their lives to the sea bottom, by means of a jointed stony stem, from the tip of which radiate feather-like, flexible appendages or arms, in the center of which is a mouth. Though now comparatively few in number, they were immensely numerous in former ages, and many carboniferous limestones are almost entirely made up of the stems, which break apart into circular sections. See ECHINODERMATA.

Crinoline, *krin'ō lin*, originally, a stiff, wiry fabric, made of horsehair and used by women for petticoats, to make their dress skirts stand out from the figure. Later, the same name was applied to the hoop skirt, an article made of steel wire and tapes and used for the same purpose as the crinoline. Modern crinoline is a cotton gauze, dressed with glue and used for stiffening garments.

Cripple Creek, COL., the county-seat of Teller co., 30 mi. s. w. of Colorado Springs, on the Florence & Cripple Creek, the Midland Terminal and other railroads. The place was founded in 1890 as a mining town and developed rapidly after 1893, although it was almost destroyed by fire in 1896. The location has attractive scenery among the mountains, at an elevation of 9800 feet. It is the trade center of the famous Cripple Creek gold mining district, has several cyanide mills and other mining industries. Mining is the chief occupation, and the output is almost entirely of gold. Population in 1910, 6206.

Crisp, CHARLES FREDERIC (1845-1896), an American soldier, jurist and statesman, born in Sheffield, England. He came to the United States at an early age, served in the Confederate army three years, took up the practice of law and rose rapidly in his profession, becoming solicitor general and judge of the superior court of the State of Georgia. He was a Democratic member of Congress from 1882 until his death, and from 1892 to 1896 he was speaker of the House of Representatives.

Crispi, *kre'spe*, FRANCESCO (1819-1901), an Italian statesman. He attempted to secure the overthrow of Ferdinand II and to unite the two Sicilies, aided in the insurrection of Palermo and was obliged to flee to Marseilles when the Neapolitans entered Palermo in 1849. Ten years later he returned to Italy in disguise, joined Garibaldi and became a leader in the movement that made Italy a free and united kingdom. Crispi entered the cabinet of Victor Emmanuel and was made premier in 1887

Crittenden Compromise

His greatest work as a statesman was the formation of the Triple Alliance. See TRIPLE ALLIANCE.

Crit'tenden, GEORGE BIBB (1812-1880), an American soldier, born at Russellville, Ky. He graduated at West Point in 1832, served in the Mexican War and became lieutenant colonel in 1856. He joined the Confederate army at the opening of the Civil War and was appointed major general, having charge of a large part of Kentucky and Tennessee. He was defeated at Mill Spring and left the service, later reëntering it as a volunteer.

Crittenden, JOHN JORDAN (1787-1863), an American statesman, born in Woodford co., Ky. He graduated at William and Mary College, served in the War of 1812, in the state legislature, in the United States Senate, several times as attorney general and finally as governor of Kentucky. Largely through his influence the state of Kentucky maintained its adherence to the Union. He was the author of the "Crittenden Compromise," which, however, failed of adoption. See CRITTENDEN COMPROMISE.

Crittenden, THOMAS LEONIDAS (1815-1893), an American soldier, born in Russellville, Ky., the son of John Jordan Crittenden. He studied law, became prosecuting attorney and served as lieutenant colonel of a regiment during the Mexican War. Later he was appointed to the consular service at Liverpool and at the opening of the Civil War he entered the Union army. He was appointed brigadier general of volunteers and later major general of volunteers for gallantry at the Battle of Shiloh. He also took a conspicuous part in the battles of Murfreesboro and Chickamauga, but resigned from the army in December, 1864. Crittenden entered the regular army as colonel in 1866, was brevetted brigadier general and served on the frontier until 1881, when he retired.

Crittenden Compromise, a proposition introduced in the United States Senate in 1860 by Senator John Crittenden, for the passage of an amendment to the Constitution, which would divide the Union into two sections, one composed of free states and one of slave states, the boundary line being the latitude of 36° 30'. The Federal government was not to have the power to abolish slavery in the District of Columbia, nor to prohibit the interstate slave trade, nor to abolish slavery in a slave state. It was lost in the Senate on March 2, 1861, by a vote of 20 to 19, and in the House, January 14, 1861, by a vote of 113 to 80.

Croa'tia and Slavo'nia, a crown land of Austria-Hungary, bounded on the n. w. by Carniola and Styria; on the n. e. and e. by Hungary; on the s. by Servia, Bosnia and Dalmatia, and on the s. w. and w. by the Adriatic Sea and Istria. It is composed of Croatia, the larger part, occupying the western portion, and Slavonia, between the Drave, the Danube and the Save, in the east. The country is mountainous and hilly and is traversed by offshoots of the Alps. Along the Drave and the Save are level plains. In Croatia there are highlands known as the Karst, remarkable for their deep-cut valleys and for their subterranean watercourses. The country in general is very fertile, both in the mountainous parts of Croatia and in the plains of Slavonia. Among the crops are wheat, maize, pulse, potatoes, flax, hemp and tobacco. There is also much timber. Manufacturing industries are carried on in a small way, the chief of them being the production of cotton and silk fabrics. Most of the population are Croats and Serbs, and three-fourths are Roman Catholics, the remainder being members of the Greek Church. Area, 16,423 square miles; population in 1910, 2,619,291.

Crocid'olite, a sort of fibrous quartz of lavender-blue or leek-green color, found in South Africa and used to some extent in making ornaments.

Crock'et, in Gothic architecture, an ornament placed on the angles of the inclined sides



CROCKETS

A, from choir of Notre Dame, Paris, about 1160; B, gable crocket, fourteenth century

of pinnacles, canopies or gables. Crockets were usually carved in the form of curved or bent foliage, and also in the form of animals.

Crock'ett, DAVID (1786-1836), a famous American frontiersman, soldier and politician, born in the State of Tennessee. His early training was that of the typical wild frontier of the early nineteenth century. He received little or no education, but had considerable native shrewdness and wit and by an outdoor life he became a remarkably skilful hunter. He

took part in the war against the Creek Indians, serving under General Andrew Jackson, and was three times elected to Congress, where he attracted no little attention by his eccentricity of manner and dress. Soon after retiring from Congress, he took up arms with the Texans in their war for independence, and at the Alamo in 1836 he was one of the six survivors of the siege who were captured and massacred by the Mexicans under General Santa Anna. He published during his lifetime several books of travel and adventure, among which were *A Narrative of the Life of David Crockett*, *A Tour to the North and Down East* and *Exploits and Adventures in Texas*. They were all characterized by atrocious grammar and crude and often coarse humor, but they displayed the same untrained common sense which he exhibited in his eventful career.

Crockett, SAMUEL RUTHERFORD (1860-1914), a Scotch novelist, educated at Edinburgh University. Some years after his graduation he traveled in Europe, North Africa and Asia, and for the eight years following 1886 he was a minister at Penicuik. Among his best-known works are *The Stickit Minister*, *The Lilac Sunbonnet*, *Bog-Myrtle and Peat*, *Ladies' Love*, *The Standard Bearer* and *The Banner of Blue*.

Croc'odile, the most highly developed reptile, allied to the alligator. The true crocodile inhabits the warm regions of the eastern hemisphere, though some species are found in North and South America. The crocodile of the Nile is one of the best known members of the family. In olden times this animal was worshiped by the Egyptians, who preserved the bodies of crocodiles with almost as great care as the bodies of human beings. The natives of southern Asia and the Moluccas fear the species common there, because of its fondness for human flesh. The skin and flesh of the crocodiles form articles of commerce of considerable importance in the East. See ALLIGATOR; GAVIAL. (See illustration on next page.)

Cro'cus, a genus of plants of the Iris family, one of the most common ornaments of our spring gardens. Most of the species are natives



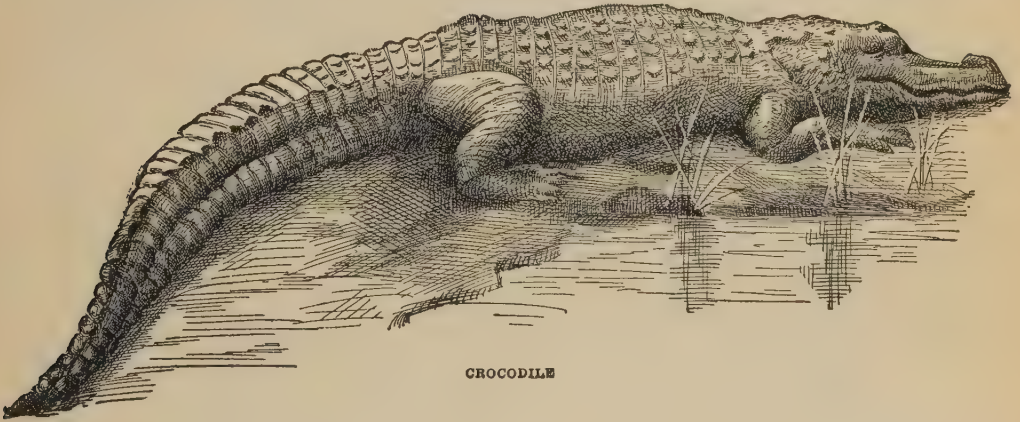
of the south of Europe and the levant; and three grow wild in Britain. The early spring flowers appear as soon as the snow has left the ground, even before their leaves. They are of a great variety of colors, and unless the winters are very cold, will grow from year to year.

Croesus, *kree'sus*, the last king of Lydia, who lived in the sixth century B. C. His riches, obtained chiefly from mines and the gold dust of the river Pactolus, were greater than those of any king before him, so that his wealth became proverbial.

Cro'ker, JOHN WILSON (1780-1857), an English writer and politician. He was one of the founders of the *Quarterly Review* and one of

bankruptcy, and made equal, from an administrative point of view, to other modern states. In 1908 he published *Modern Egypt*, a just and interesting history of the country from 1876.

Cromlech, *krom'lek*, an ancient monument, consisting of several large stone slabs fixed vertically in the ground and supporting a flat stone, which served as a roof for the sepulchral chamber. Sometimes the cromlech was surrounded by a ring of standing stones, and sometimes it was covered over with earth to form a mound. Some of these mounds were of great size, that of Silbury Hill, Wiltshire, England, being 170 feet high and 316 feet along the slope. Remarkable cromlechs are found in Great



CROCODILE

its ablest contributors. Besides his articles for that magazine, he wrote *Talavera*, a poem and *Stories from the History of England for Children*. He also brought out an edition of Boswell's *Johnson*.

Cromer, EVELYN BARING, first Earl (1841-), a British diplomat, born at Cromer Hall, in Norfolk. He joined the Royal Artillery in 1858, and received several promotions before his appointment, in 1872, as secretary to Lord Northbrook, viceroy of India. In 1876 he became British commissioner of the Egyptian public debt, and three years later controller-general in Egypt. He distinguished himself in these positions, but in 1880 was transferred to India, where he became finance minister. Three years later he was appointed British consul-general and minister plenipotentiary in Egypt, and in these capacities served until 1907, when ill-health compelled him to resign. He was created earl in 1901. Every department of Egyptian government profited from Lord Cromer's rule; the country was saved from

Britain, Ireland, Scandinavia and northern France.

Crompton, SAMUEL (1753-1827), inventor of the mule jenny. When only twenty-one years of age he invented his machine for spinning cotton, which was called a *mule*, from its combining the principles of Hargreaves' spinning-jenny and Arkwright's roller-frame, both invented a few years previously. Though his invention was a very important one, Crompton received little reward or recognition and died in poverty.

Cromwell, OLIVER (1599-1658), Lord Protector of the Commonwealth of England, Scotland and Ireland, was born at Huntingdon and educated at Sidney-Sussex College, Cambridge. He married Elizabeth, daughter of Sir James Bouchier, and for some years after his marriage he lived on his estate in Huntingdon. In 1628 he was member of Parliament, but he seems to have made no pronounced impression on that body at that time. In 1631 he went with his family to a farm which he had taken at Saint Ives; and some years later he removed to Ely,

where he had inherited a property. He was again elected to Parliament in 1640 and took part in its deliberations on all important topics, without, however, becoming very prominent. In the summer of 1642 he was actively engaged in raising and drilling volunteers for the Parliamentary party, and he served as captain and colonel in the earlier part of the struggle between Parliament and the king, distinguishing himself through his disciplinary powers and the well-drilled character of his troops. When the army was reorganized and, through the "self-denying" ordinance, all members of Parliament were excluded from commands, an exception was made in favor of Cromwell, who kept his command of the cavalry. On the occasion of the surrender of Charles by the Scottish army in 1646, Cromwell was one of the commissioners, and in the distribution of rewards for services he received \$12,500 a year from the estates of the marquis of Worcester. Affairs in Ireland demanding his presence, he was appointed lord lieutenant and commander in chief; and by making a terrible example of Drogheda, he



OLIVER CROMWELL

crushed the royalist party in that country within six months. Resigning the command to Ireton, he undertook, at the request of the Parliament, a similar expedition against Scotland, where Charles II had been proclaimed king. He saved himself from almost inevitable disaster by the splendid victory at Dunbar, and a year later he put an end to the struggle by his total defeat of the royalists at Worcester.

The Rump Parliament, as the remnant of the Long Parliament was called, had become worse

than useless, and in April, 1653, Cromwell, with his soldiers, dispersed that body. He then summoned a council of state, consisting mainly of his principal officers, which finally chose a Parliament of persons selected from the three kingdoms, nicknamed *Barebones Parliament*, or the *Little Parliament*. Fifteen months later a new annual Parliament was chosen; but Cromwell soon prevailed on this body, who were totally incapable of governing, to place the charge of the Commonwealth in his hands. The chief power now devolving again upon the council of officers, they declared Oliver Cromwell sole governor of the Commonwealth under the name of Lord Protector. Although practically absolute, Cromwell's government was wise and moderate, and restored England in the eyes of other nations to the position of dignity which she had lost.

Crook, GEORGE (1828-1890), an American soldier, who graduated at West Point in 1852. He was captain at the outbreak of the Civil War, and at its close was brevetted major general. Transferred to Idaho and later to Arizona, he thoroughly subdued the Piutes and Apaches. He had much to do with making these indians self-supporting-tribes.

Crookes, WILLIAM, Sir (1832-), an English scientist,* born in London and educated at the Royal College of Chemistry. He began his career as superintendent of the meteorological department of Radcliffe Observatory and then became professor of chemistry at the Chester Training College. Professor Crookes occupies a foremost place among scientific men and is considered the highest authority on the application of the principles and laws of chemistry to the industrial arts and on sanitary matters. He has given much attention to the relation of chemistry to various lines of industry, and among his discoveries is the sodium amalgam process for separating gold and silver from their ores and a special method for the study of substances through the spectroscope. His experiments in electricity led to the invention of Crookes tubes (See CROOKES TUBES), so generally used in electrical experiments. Among his most widely known works are *A Practical Handbook of Dyeing and Calico Printing* and *Select Methods of Chemical Analysis*. He is the editor and proprietor of the *Chemical News*, which he founded in 1859.

Crookes Tubes, glass tubes or vessels from which the air has been exhausted and which contain electrodes at opposite ends. These tubes are used in electricity to secure various

effects of electrical discharge. They take their name from the inventor, Sir William Crookes.

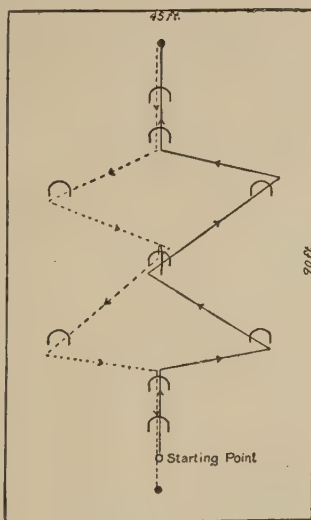
Geissler tubes are of a similar pattern, invented by Geissler. When used in connection with an induction coil and an electrical machine in the dark room, these tubes produce many beautiful luminous effects. A peculiar pattern of them is also used in the production of cathode rays. See CATHODE RAYS.

Crooks'ton, MINN., the county-seat of Polk co., in the northwestern part of the state, on the Red Lake River and on the Great Northern and the Northern Pacific railroads. The city is the most important railroad center in that part of the state and is located in the Red River Valley, which produces enormous quantities of wheat. The river affords good water power, and there are manufactures of lumber, farm implements, machinery, wagons and other articles. It contains a fine courthouse, a gymnasium, seventeen churches and a public library. The place was settled in 1872 and was incorporated seven years later. Population in 1910, 7559.

Croquet, *kro ka'*, an open-air game, in which two or more persons with long or short-handled mallets endeavor to drive balls through a series

of nine or ten wire arches (*wickets*) set in the ground in a certain arrangement. In the accompanying figure the wickets are set in the most common way. A croquet set consists of eight balls, painted to correspond with eight mallets; two stakes, with bands to match the colored balls in the same order on each,

and ten wickets. The object of the game is to start from one stake, make the circuit of the arches on one side, touch the lower stake and return through the arches of the other side to the starting stake (See the diagram). If two people play, each may use two balls; but when four play, each has but one ball. The game is not entertaining for more than six. The players play alternately,



and the side first completing the circuit wins the game. Special rules are formulated to cover emergencies, and a number of technical terms are in general use. A *rover*, for instance, is a ball that has made the circuit of the field but has not touched the starting stake; such a ball may play upon every other ball in the field in one turn. A *dead ball* is one that has been played upon since a point was made.

Crosby, *kroz'by*, HOWARD (1826-1891), an American Presbyterian clergyman, born in New York. He graduated at the New York University in 1851. In addition to contributions to periodicals, magazines, tracts and lectures, he is the author of a number of theological works. He organized the Society for the Prevention of Crime, was president of it for several years and was very active against the liquor traffic. He was a member of the American committee that revised the New Testament.

Crosier, *kro'szhur*, the staff borne by some of the higher dignitaries of the Roman Catholic and other churches, and probably the oldest of the insignia of the episcopal dignity. The original form of the staff resembled a shepherd's crook, but from the middle of the fourteenth century the archbishops began to carry, sometimes in addition to the pastoral crook, sometimes instead of it, a crosier terminating in a cross or double cross.

Cross, one straight body laid at any angle across another. Among the ancients a piece of wood fastened across a tree or upright post formed a cross, on which were executed criminals of the worst class. It had, therefore, a place analogous to that of the modern gallows as an instrument of punishment until, from the crucifixion of Christ, it came to be regarded by Christians with veneration. The Church adopted it as the peculiar symbol of the Christian religion, and it is still, especially in the Roman Catholic Church, paid peculiar honors.

Cross, MARY ANN or MARIAN. See ELIOT, GEORGE.

Cross'bill, a species of finch. The two mandibles are so strongly curved that the upper crosses the lower one when the bill is closed. These crossed bills are used with great power to tear pine cones to pieces for the seed which they contain. The crossbills can tear wood readily and soon destroy a wooden cage if confined in it. The male is reddish in color, and the female is of a yellowish-green. But few species are known in the United States, and these are confined almost wholly to the pine

forests. One fanciful legend says that the bill of the bird was crossed in trying to draw the



AMERICAN CROSSBILL

nails from the hands of Christ when he was crucified.

Cross'bow or **Arbalest**, formerly a very common weapon for shooting, consisting of a bow fastened across a stock. The bow, which was often of steel, was usually bent by a lever windlass, or other mechanical contrivance, the missile usually consisting of a square-headed bolt, but occasionally of short arrows, stones or leaden bullets.

Cross Fer'tiliza'tion, fertilization by which the pollen from the stamens of one plant is conveyed to the pistils of another. This is accomplished by the agency of wind and water and by the aid of insects or birds. The effect of this process is that better seeds, that is, those which produce stronger and more fruitful plants, are produced. Botanists have found many special adaptations by means of which cross fertilization is effected. If, for instance, the anther and stigmas become mature at different times on the same plant, it is clear that the stigma can be fertilized only by the pollen of another plant; if the stigma and anthers are so placed that the pollen cannot fall on the stigma, it may fall on some insect which will carry it to another flower; again, in case the stigmas are borne on one plant and the pistils on another, the wind or some other agency must carry the pollen. More complex modes are also common; The stamens of the barberry are very sensitive and when touched by an insect, throw the pollen upon the pistil. Some plants, such as *Linths*, are provided with levers, by means of which the pistil is thrust forward upon the insect previously dusted by the pollen. The pollen is

sticky in some plants and adheres to the tongue of the insect. Some plants, like the orchids, are provided with traps, which catch the insects by the limbs and thus force them to scatter the pollen.

Birds, as well as insects, aid flowers in distributing their pollen. Birds that feed on the nectar become dusted with pollen, which in their passage they scatter upon other pistils. Hummingbirds are especially active in performing this service.

The term *cross fertilization* is also used in a general sense and applied in the cases of animals and the human race. A limited amount of cross fertilization, if the environment and other conditions are only slightly changed is beneficial, but crosses between individuals which are too different in constitution and habits are usually detrimental. Mingling of species too closely related is also usually to the disadvantage of the offspring.

Cross'-staff, an instrument used by surveyors, consisting of a staff carrying a brass circle, divided into four equal parts by two lines, intersecting each other at right angles. At the extremity of each line perpendicular sights are fixed, the instrument being used in taking offsets.

Cro'ton, a genus of plants, either herbs, shrubs or trees, which are widely distributed and bear rather small flowers in terminal clusters. Many species are aromatic, and rich perfumes are made from some, while others yield important medicines. The species which grow in the United States are not especially valuable.

Cro'to'na, an ancient Greek colony of Italy, situated on the east coast of Bruttium. It was founded about 700 B. C. and was noted for its athletes, among whom was Milo. In 530 B. C. the disciples of Pythagoras gained authority in the city, which they held till about 510, when the people expelled them. During the war between Pyrrhus and the Romans, and in the Second Punic War, Crotona was nearly ruined. The city of to-day is called Cotrona.

Cro'ton Aqu'educt, the aqueduct extending from Croton Lake, above Ossining to New York City. The first aqueduct was completed in 1842. It is forty and one-half miles long, about eight and a half feet high and nearly eight feet wide. It is constructed of stone, brick and cement. The water is taken across Harlem River in three cast-iron pipes, which are supported on a bridge one hundred fifty feet high

Croup

and about one thousand four hundred feet long. This aqueduct was designed to carry seventy-two million gallons a day, but it was soon found too small to supply the needs of the city. A second aqueduct was completed in 1890, also extending from Croton Lake to 135th Street, New York. It is about thirty-one miles long, nearly thirty miles of which are a horseshoe-shaped tunnel thirteen and a half feet square. The new aqueduct crosses the Harlem River by an inverted siphon, which is three hundred feet below the river bed. Its capacity is over 300 million gallons a day. It is connected with the Jerome Park storage reservoir, about twenty-three miles from the dam. For six miles from this point the section is circular and twelve and one-half feet in diameter, having its capacity reduced to 250 million gallons. See **AQUEDUCT**.

Croup, *kroop*, a disease, usually attacking children only, which appears in the form of a hoarse cough, accompanied by difficult breathing and the appearance of suffocation. It usually occurs in the night and may be repeated, each attack lasting several hours and terminating in some fever. Sometimes, in the case of ill-nourished or feeble children, the disease is fatal. Inhaling warm vapors of water will often relieve the difficulty, but in severe cases a physician should be called.

A second variety of the disease is known as *membranous croup*, which is diphtheria of the larynx and is caused by the same bacillus that is active in diphtheria. In *false croup*, as the first species is known, nothing is coughed up, but in membranous croup pieces of membrane are expelled. Death may come from convulsions or from suffocation, though frequently the latter is prevented by the operation known as tracheotomy, in which a tube is inserted into the windpipe below the inflamed tract. Through this tube the patient breathes. See **DIPHTHERIA**.

Crow, one of a family of birds containing about 200 species, found in nearly all part of the world. The American crow is eighteen or nineteen inches in length and has a compact, glossy plumage with some greenish reflections. The crows are social birds that sometimes gather in large flocks, are readily domesticated and imitate human speech quite well. They make amusing pets and sometimes show an almost human intelligence, but they are mischievous and seem to take pleasure in annoying people. The wild birds also are bold, thievish

Crown Glass

and generally unpopular, though on the whole they are probably beneficial. All are birds of strong flight, and all

move along the ground by hopping, though most of them can run also. The *fish crow* is a rather small species, very common in the eastern United States. The magpies, jackdaws, rooks, jays and ravens are closely

related species, described under their proper titles. The crow of India and Ceylon is small and glossy, and is very bold and thievish.

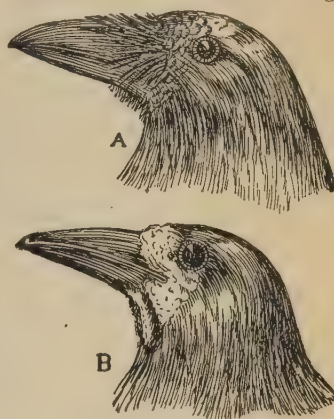
Crow, the name of a tribe of indians, about 2000 in number, now living on a reservation in Montana. Originally a very warlike race, they sided with the whites against the Sioux and often proved of great assistance, especially as scouts.

Crow'berry or **Crake'berry**, a plant resembling the heath, and bearing a jet-black berry, common in all the northern parts of Europe and Asia and North America. The berries, which have a slight acid taste and are sometimes eaten, afford a purple dye.

Crow Black'bird or **Purple Grack'le**, a large, handsome blackbird, found in the eastern parts of the United States. It is about a foot long, with glossy jet-black color and fine greenish and metallic reflection. West of the Alleghany Mountains its representative is the very similar bronze grackle.

Crown, an English coin, equivalent to five English shillings, or about \$1.22 in United States money. It was originally made of gold, but since 1551 it has been issued in silver. It bears the imprint of a crown on one side and a likeness of the ruling sovereign on the other. The crown weighs 436.3636 troy grains, of which .925 is pure silver. The name is also used to designate the monetary unit of Austria-Hungary (equal to about 20 cents in American money) and of Denmark, Norway and Sweden (equivalent to about 26.8 cents). See **SOVEREIGN**.

Crown Glass, the hardest and most colorless kind of glass, made almost entirely of sand,



A, crow's head; B, rook's head.

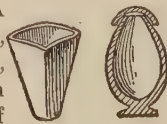
soda and a little lime. The use of crown glass is now confined to the manufacture of ornaments and lenses.

Crown Point, a township in Essex co., N. Y., chiefly important for its historical associations. It was early the site of an English trading post, was settled by the French in 1731, but was destroyed in 1759 by a British attacking party. At the outbreak of the Revolution a body of Green Mountain Boys, under Seth Warner, surprised and captured the garrison, and it was held by the Americans until Burgoyne's invasion in 1777, when it was temporarily abandoned. The ruin of the fortifications erected at this point by the British after 1759, at a cost of more than \$10,000,000, may still be seen.

Crown Point is 110 mi. n. e. of Albany and 10 mi. from Ticonderoga, on the w. shore of Lake Champlain and on the Delaware & Hudson railroad. The village is not incorporated. It has small manufactures of lumber and allied products, and there are neighboring deposits of iron ore. Population in 1910, 1690.

Croy'don, a borough of England, in Surrey, 10 mi. s. of London, of which it is practically a suburb. The town, which is a favorite residence place of merchants and business men, is surrounded by villas, mansions and pleasure grounds. It is a place of ancient origin, but from its recent rapid increase it is almost entirely new. Of special interest are the remains of the ancient palace, long a residence of the archbishops of Canterbury. Population in 1911, 169,559.

Crucible, *kru'si b'l*, an open vessel employed to hold substances which are to be submitted to a high temperature. A crucible is usually of a conical, circular or triangular shape, closed at the bottom and open at the top, and is made of various materials, such as fire clay, platinum, a mixture of fire clay and plumbago, or porcelain.



CRUCIBLES

Cruciferae, *kru sij' ur ee*. See **MUSTARD FAMILY**.

Cruelty to Animals, **SOCIETY FOR THE PREVENTION OF**. The first society for this purpose was organized in England in 1824, and it was soon influential in securing legislation which provided for the punishment of the beating or otherwise ill-treating of domestic animals, with fine or imprisonment. The first society in the United States was organized in New York in 1866, through the influence of Mr. Henry Bergh, who, during his lifetime,

was the most active representative of the society and the idea for which it stood. Through the influence of this organization, legislation has been secured in nearly every state in the Union, fixing a penalty of fine or imprisonment, or both, for abusing domestic animals. The legislation has also extended to transportation of live stock in those sections of country where stock is carried long distances before reaching market. Railways are now required to unload animals every twenty-four hours and give them rest, feed and water.

Cruikshank, *krook' shank*, **GEORGE** (1792-1878), a famous English caricaturist and illustrator of magazines, born in London. The earliest of his known drawings is dated 1799 when he was only seven years of age, and at fifteen he was comparatively distinguished. He illustrated a number of popular books, among which were several of Dickens's. He was very industrious and left an enormous quantity of work, a catalogue showing more than five thousand titles.

Crusades, *kru saydz'* (from the latin word meaning *cross*), the wars carried on by the Christian nations of western Europe, from the eleventh to the thirteenth century, for the conquest of Palestine. They were given the name because the warriors wore the sign of the cross. The antagonism between the Christian and Mohammedan nations had been intensified by the possession of the Holy Land by the Turks and by their treatment of pilgrims to Jerusalem; and the first strenuous appeal was assured of response alike from the pious, the adventurous and the greedy.

The First Crusade. The immediate cause of the first Crusade was the preaching of Peter the Hermit, who had joined other pilgrims on a journey to Jerusalem. On his return he gave Pope Urban II a description of the unhappy situation of Christians in the East and presented a petition for assistance from the patriarch of Jerusalem. The statements of the pope at the Council of Clermont in 1095 produced a profound sensation throughout Europe, and in 1096 several armies set out in different divisions. Most of these earliest crusaders, ignorant as they were of military discipline and not provided with sufficient food, perished before reaching Constantinople, which had been chosen for their place of meeting. A well-conducted regular army, however, of almost one hundred thousand knights, was headed by such men as Godfrey of Bouillon; Baldwin, brother of Godfrey; Robert

of Flanders; Robert of Normandy, brother of William II, king of England; Raymond of Toulouse, and other heroes. They traversed Germany, Hungary and the Byzantine Empire, passed over into Asia Minor, conquered Nicaea in 1097, and shortly after fought the first pitched battle at Dorylaeum, winning a complete victory after a severe contest. They then marched upon Antioch, which fell into their hands in June, 1098. Surrounded in turn by a Turkish army, they were soon reduced to pitiable straits but succeeded in routing their besiegers, and after remaining nearly a year in the neighborhood of Antioch they began their march against Jerusalem. Their numbers were now reduced to little more than twenty thousand men; but after a fierce struggle the town was taken by storm (1099) and Godfrey of Bouillon was chosen ruler of the city (See GODFREY DE BOUILLON).

The Second Crusade (1147-1149) was occasioned by the loss of Edessa, which had been taken by the Christians in the First Crusade. Fearing still graver losses, the pope, seconded by Bernard of Clairvaux, exhorted the German emperor Conrad III, and the king of France, Louis VII, to defend the cross. Both these monarchs obeyed and led large forces to the East, but returned without accomplishing anything.

The Third Crusade was undertaken after the capture of Jerusalem by Saladin in 1187, the monarchs Frederick Barbarossa of Germany, Philip Augustus of France and Richard I of England, leading their armies in person. Richard and Philip Augustus agreed to unite their forces at Messina in Sicily, where they spent six months at the end of 1190 and beginning of 1191. Jealousies arose, however, between the monarchs, and within a few weeks after the fall of Acre the French king returned to Europe. Richard, now sole leader of the expedition, defeated Saladin; but having twice vainly set out with the design of besieging Jerusalem, he finally concluded a truce of three years and three months with Saladin, who agreed that pilgrims should be free to visit the Holy Sepulcher, and that the whole seacoast from Tyre to Jaffa should belong to the Crusaders.

The Fourth Crusade was set on foot by Pope Innocent III in 1202. Among its chief promoters were Geoffrey of Villehardouin, Baldwin of Flanders and the marquis of Montferrat, who was chosen leader. The Crusaders assembled at Venice in the spring, but were diverted from

their original purpose, first by the capture of the Dalmatian town of Zara, and then by the expedition which ended in the sack of Constantinople and the establishment of a Latin empire there (1204).

The Fifth Crusade (1228-1229), that of Frederick II, emperor of Germany, was undertaken in fulfillment of a vow. Frederick entered into negotiations with the sultan of Egypt, and without any fighting gained possession of the kingdom of Judea on the condition of tolerating in his kingdom the Mohammedan worship. He then concluded a useless truce of ten years and was crowned at Jerusalem.

The Sixth (1248-1254) and *Seventh* (1270) *Crusades* were led by Louis IX of France. In the first of these expeditions he took Damietta and marched up the Nile, but was compelled to retreat and finally to surrender with his whole army. He was released only on payment of a large ransom. The second expedition was still more disastrous in its results than the first. He landed his army on the northern coast of Africa, but he himself and a large number of his knights died before Tunis. A crusading army under Prince Edward of England (after Edward I), originally intended to cooperate with that of Louis, landed at Acre in 1271, but little was effected beyond a new truce for ten years.

Authorities do not all agree as to the numbering of these Crusades, as there were in the intervals between the greater movements constant minor expeditions. Most remarkable of these lesser crusades was the *Children's Crusade* in 1212. It is believed that about fifty thousand boys and girls took part in this movement. A band of German children marched south to the Mediterranean and although thousands of them died of privation by the way, the remainder pressed on, confident that a way would be opened to them through the sea. When their hopes proved false, some of them remained in Genoa and some attempted to return to Germany, but few of them ever arrived at home. The French children gathered at Marseilles, and two merchants managed to entice them on board ship, with the promise of free transportation to the Holy Land. Two of the ships were wrecked and the children on the others were sold in Alexandria as slaves.

Despite the fact that the Crusades failed entirely in their real object, they were of inestimable importance in European history for many reasons. The European nations became better acquainted with one another; the power of the

Church was materially increased; the citizen class gained much influence, partly because the nobility suffered by extravagant contributions to the Crusades, and partly because the enlarged commercial intercourse greatly augmented the wealth of the cities. Another important political result of the Crusades was the growth of the royal power at the expense of that of the nobles. Intellectually the Crusades were of the utmost value, because they brought to the notice of Europeans the civilization of the Saracens, which was much higher in many respects than that of any of the western nations.

Crustacea, *krus ta'she ah*, the highest group of jointed animals (See ARTHROPODA). There are about ten thousand living species, the majority of them being sea animals, though a few are found upon the earth or in stagnant or running fresh waters. The smaller ones are an important source of food to other marine animals, while some of the larger types are among the favorite sea foods of all nations. Crustaceans have five pairs of appendages on the head, and all of their limbs excepting the first pair are forked. The entire body is covered with a hard coating, which in some forms is almost bonelike, but in others is merely tough and leathery. The animals lay eggs, which are almost always hatched in water, though some of the land species carry the eggs and young on the under side of the abdomen. As the animal grows its skin becomes confining at intervals, and so it is cast off, together with the shell which it has secreted. See TRILOBITE; BARNACLE; SHRIMP; LOBSTER; CRAB.

Cry'olite or **Kry'olite**, a mineral, a native fluoride of aluminum and sodium, found at Evigtok, in Greenland, whence it is exported. It is of a pale grayish-white or yellowish-brown, occurs in masses of thin layers folded upon one another and has a glassy luster. It has been employed as a source of aluminum, and in the manufacture of a hard, porcelain-like glass of great beauty.

Cryophorus, *kry of' or us*, an instrument for showing the diminution of temperature in water by its own evaporation. Wollaston's cryophorus consists of two glass globes, united by a moderately wide glass tube. Water is poured in and boiled to expel the air, and while boiling continues the apparatus is sealed air-tight. When the instrument is to be used, the water is made to run into one of the globes, and the other is buried in a freezing mixture. The vapor in the globe is thus condensed, and a vacuum is produced; fresh vapor rises from the

water in the other globe, which is itself condensed; these processes repeat themselves till the water remaining in the globe has been, by evaporation, cooled to the freezing point. A toy instrument, similar in construction, containing sulphuric ether and used in physical laboratories to illustrate the low temperature at which ether boils in a vacuum, is called a *pulse glass*.

Crypt, *kript*, a vault under a church, designed originally to receive the bodies of the saints and martyrs. It developed out of the *confession* and became enlarged so as to contain the altar and a room to worship relics. It generally occupied the space below the transept, choir and apse. From the ninth to the thirteenth century the crypt formed an important feature of church architecture, particularly in the Romanesque style. One of the famous examples is that under the Glasgow Cathedral, and others are found in the cathedrals of Canterbury, Gloucester and Saint Mark's and in the Church of Saint Peter's. See ALTAR.

Cryptog'amous Plants or **Crypt'ogams**, a term that includes all plants of organization inferior to that of the flowering plants. In contrast with these the seed-bearing plants are often called phanerogams. See BOTANY.

Cryptog'raphy, the art of writing in secret characters or ciphers, or with sympathetic ink. The simplest method consists in choosing for every letter of the alphabet some sign or another letter or group of letters. From the earliest times forms of cryptography have been in use, and in modern times the most elaborate and difficult cryptograms have been invented. The deciphering of such cryptograms has come to be an art, and it may be stated with some confidence that any cryptogram based on a regular mathematical principle can be solved.

Crystalline, *kris'tal line* or *kris'tal lin*. **Lens**. See EYE.

Crystalline Rocks, rocks of a crystalline texture, such as granite, believed to have acquired this character by the action of heat and pressure. See IGNEOUS ROCKS.

Crystallog'raphy, the science which classifies the numerous forms of crystals and shows the relation between them. All inorganic substances, when solidifying, tend to form in crystals, and the forms thus produced are numbered by the thousands, but these can all be classified under six systems, as follows:

1. THE REGULAR CUBIC SYSTEM. Crystals of this system have three lines or axes of equal length, crossing each other at the middle

point at right angles. The ends of the axes lie in the center of the respective planes of the crystal. The regular crystals of this system are cubical. Common salt, iron pyrites, galena or lead sulphide, silver, copper and gold are examples of substances crystallizing on this plan.

2. THE SQUARE PRISMATIC SYSTEM. In this system the axes are at right angles to each other, but one may be longer than the other two. The short axes may terminate in the middle of the planes of the crystal or at the edges of these planes, and the long axis may terminate in a point where all the faces meet. This arrangement forms a pyramid, or the crystal may have the form of two pyramids, with their bases together. Binoxide of tin, calomel and yellow prussiate of potash are common examples of this form of crystals.

3. THE RIGHT PRISMATIC SYSTEM. In this the three axes are all of unequal length, but are

some forms of tartaric acid crystallize according to this plan.

6. **THE HEXAGONAL RHOMBOHEDRAL SYSTEM.** This system has four axes, three of which are in the same plane and inclined to each other at an angle of sixty degrees, while the fourth is perpendicular to them. This system gives a regular six-sided prism. Many varieties of limestone crystallize according to this plan, and some of the crystals are so minute that they cannot be seen without a microscope.

Cu'ba, THE REPUBLIC OF. The Republic of Cuba includes Cuba, the Isle of Pines and several other small adjacent islands. Cuba, the largest of the West Indies, lies between 78° 8' and 84° 58' west longitude and 19° 15' and 23° 9' north latitude, between the Caribbean Sea and the Gulf of Mexico. It is 130 mi. s. of Florida and about equally distant from Yucatan on the w. and Haiti on the e. Its greatest



placed at right angles to each other. The crystals belonging to this system are of the form of right rhombic prisms and rhombic-based octahedrons. Sulphate of potash, sulphur, nitrate of potash and topaz crystallize on this plan.

4. THE OBLIQUE PRISMATIC SYSTEM, in which two of the axes are placed at right angles to each other, while the third is inclined. The axes may all be of different lengths. The crystals take the form of oblique prisms. Borax, copperas (sulphate of iron), sulphate of soda and carbonate of soda (sal soda) are common examples.

5. THE DOUBLE OBLIQUE PRISMATIC SYSTEM. A crystal in this plan has three axes of unequal length, intersecting obliquely with each other. The crystals of this system are often irregular and difficult to classify. Blue vitriol (sulphate of copper), sulphate of manganese and

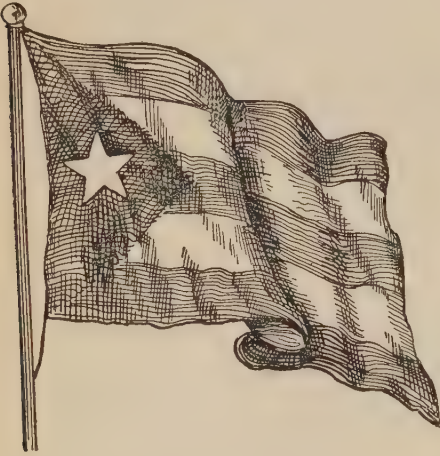
length from east to west is 760 mi., and it varies in breadth from 25 mi. to 130 mi. The area, including the Isle of Pines, is about 43,500 sq. mi., or a little larger than the State of Tennessee.

SURFACE AND DRAINAGE. The Copper Mountains traverse the island from east to west and form a low watershed, varying from 11 to 400 feet in altitude. The highest peak is Pico Torquinos, which has an altitude of about 8400 feet. From each side of the watershed the surface slopes gradually to the coast, forming undulating, well-watered plains, covered with luxuriant forests and plantations. Numerous lagoons and salt marshes occur in the lowlands along the coast. The irregularity of the coast line provides a number of good harbors, but in many places the coast is low and rocky and the water is shallow.

The island has about 200 streams large enough

to be called rivers, but they are all short, and only a few are navigable. The Rio Canto, which is the largest, admits of the passage of boats for 60 miles. There are only a few small lakes, but the large salt water lagoons on the north side resemble lakes.

CLIMATE. Cuba has a tropical climate. The mean annual temperature is 78°, and the maximum seldom exceeds 88°. July and August are the hottest months. The average annual rainfall at Havana is 90 inches, and, with few exceptions, the entire island has an abundance of rain for all agricultural purposes. Only a few small areas in the interior require irrigation. In the highlands the climate is generally healthful, but in the lowlands much



CUBAN FLAG

The triangular field is red; the stripes are alternately blue and white.

sickness prevails, although recent experience seems to indicate that this is due more to the unsanitary condition of the country than to the climate.

MINERAL RESOURCES. Deposits of coal, copper, gold, silver and iron are found. Copper has been mined in the mountains with profit, and iron ore is shipped from the Province of Santiago to the United States, the annual shipment amounting to about 600,000 tons. Asphalt is obtained in the Bay of Cardenas, and considerable salt is procured in other localities. The other mineral deposits are not of sufficient extent to warrant working.

AGRICULTURE. The island is covered with a luxuriant growth of vegetation. Flowers, grasses and many varieties of herbaceous plants are found on the lowlands, while the mountains to their summits are clothed with heavy forests,

containing mahogany, ebony, rosewood, granadilla, cedar, live-oak and other valuable timber. The soil and climate are favorable to agriculture, which is the leading industry. Previous to the last war for independence, the country contained over 90,000 plantations, farms, cattle ranches and orchards. During the war many of these were devastated, but since the establishment of an independent government agriculture has been rapidly advancing. Sugar, tobacco, coffee and tropical fruits are the leading products. Of these sugar is the most important, and it is estimated that when all of the land suitable for growing sugar cane is under cultivation, an annual crop of a half million tons of sugar can be produced. The chief provinces devoted to sugar cane are Santa Clara and Matanzas. Tobacco is second only to sugar in importance, and a large revenue is derived from its growth and manufacture. Cuban tobacco maintains a standard value in all markets, on account of its excellent flavor, and the province of Pinar del Rio is the most important tobacco producing region in the world. Cattle raising is an important industry, and large areas are given to the growing of vegetables, corn and poultry. Bee keeping is also successful.

The manufactures are practically confined to cigars and other products of tobacco and to the manufacture of raw sugar.

TRANSPORTATION AND COMMERCE. Roads are generally poor, and lack of good means of transportation in the interior is a great hindrance to commerce. Havana is connected with Pinar del Rio, Matanzas, Cabanas, La Isabella and Cienfuegos by railway. A line of railway also extends across the island from Moron to Jucaro, and another connects Puerto Principe with the port of Neuvetas. In all, there are about 1350 miles of railway, most of which is in poor condition. There are also some 3000 miles of telegraph lines. The irregularity of the coast provides numerous good harbors, about forty being accessible to ocean-going vessels. Havana, Matanzas, Cabanas, Cienfuegos and Santiago de Cuba are the important seaports. Regular communication is maintained with the Atlantic and Gulf ports of the United States and with the commercial centers of Europe. Cuba is situated at the convergence of many transatlantic routes, and the ships of all nations find their way into the harbor of Havana, the principal seaport. The commerce of the island is rapidly growing. In 1910 the foreign trade amounted to \$228,420,885, of which \$124,745,304

were exports and \$103,675,581 imports. Most of the foreign trade is with the United States.

INHABITANTS AND LANGUAGE. The inhabitants consist of native Cubans, who are descendants from the early Spanish families; Spaniards who have more recently settled in the country and constitute about one-tenth of the population, and a mixed class, descendants of the former slaves of African blood, and Spaniards. The last constitute a large proportion of the population. There are also a number of Chinese coolies and a few Americans. Spanish is the prevailing language. Population in 1907, 2,048,989.

EDUCATION. Previous to the establishment of an independent government, education had been grossly neglected, and most of the people were illiterate. Under the regime of the United States (See subhead *History*, below), a good system of public schools was established on the American plan, and the provinces and municipalities were made responsible for the education of children within their borders. The University of Havana has faculties of letters, science, law, medicine and pharmacy and has an average enrollment of about 600 students.

GOVERNMENT. Cuba is governed in accordance with the Constitution adopted by a representative convention, February 21, 1901. The government is republican in form and differs



A SCENE IN RURAL CUBA

but slightly from that of the United States. The head of the administration is the president, who must be a native Cuban or a naturalized citizen who served ten years in the Cuban army during the wars for independence. He is elected by popular vote for a term of four years and cannot serve more than two consecutive terms. He appoints and removes members of his cabinet, who are responsible to him for the administration of their departments. The legislative power is vested in a Congress, consisting of two houses,

a Senate and a House of Representatives. The former contains four senators from each of the six provinces. The House of Representatives consists of one member for every twenty-five thousand inhabitants or fraction thereof more than 12,500. They are elected for four years, one-half retiring every two years. Congress holds annual sessions, controls the financial and foreign affairs of the Republic and makes general laws for the administration of the government, as well as of some phases of provincial government. The island is divided into six provinces: Havana, Matanzas, Pinar del Rio, Puerto Principe, Santa Clara and Santiago. Each province has a governor and an assembly, both elected by the people for a period of three years. There is a supreme court for the interpretation of the Constitution, its judges being appointed by the president with the approval of the Senate. Every male Cuban over twenty-one years of age and not mentally incapacitated or convicted of crime, all Spanish residents who have been on the island since April 11, 1899, and all foreigners who have resided there since January 1, 1899, are entitled to franchise. Foreigners who have taken up their residence there since January 1, 1899, are required to show five years' residence for naturalization.

HISTORY. Cuba was discovered by Columbus in 1492. It was settled in 1511 by Diego Columbus, son of Christopher, who founded Santiago in 1514, and in 1519 the present city of Havana was established. This settlement soon became the foremost town in the island and the center of government. From the first, the Spaniards reduced the natives to slavery and treated them so cruelly that by the middle of the sixteenth century the race was almost extinct. This required the introduction of negroes from Africa, and they were employed so constantly and under such terrible conditions that mortality among them was greater than increase, and the government was compelled to import constantly increasing numbers. Havana was destroyed by the French in 1534 and again in 1554 and was captured by the Dutch in 1624, but it was immediately restored and thereafter was repeatedly the prey of filibusters and pirates. During the eighteenth century, Cuba was exploited by a line of vicious and oppressive governors general, but after the Seven Years' War, during which England had captured the island only to return it to Spain in 1763, prosperity ruled and the resources of Cuba were developed. Still, unscrupulous governors general were enabled to repress

its natural progress by exacting enormous taxes and vast sums in tribute. The island was attractive to American statesmen, especially those of the South, as a field for the extension of slavery, and it was the secret ambition of many presidents to gain control of it by purchase. Finally, in 1848, President Polk offered \$100,000,000 to Spain, but it was refused. In 1854 eminent American ministers to Great Britain, France and Spain, among whom was James Buchanan, united in drawing up the Ostend Manifesto, which urged the United States to annex Cuba by force if Spain refused to sell. Nothing came of these efforts.

Meantime, the people of Cuba were striving to abolish slavery and to gain their independence. Many insurrections occurred, notably those of 1849 and 1854, which, though causing great suffering, accomplished little. Finally, in 1868, began a ten years' struggle which extorted from the Spanish government the promise of liberal government, representation in the Spanish parliament and the encouragement of industry. These promises were but partly kept, however, and discontent increased until 1895, when the last great rebellion broke out. Spain sent General Campos to the island to suppress the rebellion, but the insurgents under Gomez, Maceo and Garcia continued to gain successes and by guerrilla warfare completely checked the efforts of the Spanish soldiery to pacify the island. Campos was succeeded by Weyler, who undertook such savage measures that sympathy was aroused for the Cubans throughout the world, and especially in the United States. Weyler was superseded by Blanco in 1897, and in spite of the promise of autonomy the insurrection continued and seemed to gain strength in the following winter. Cuba meantime had frequently requested the United States to interfere in its behalf, and the time seemed opportune for such interference when an American warship, the *Maine*, was destroyed in Havana harbor, February 15, 1898, by some mysterious cause which the American people believed to be known to Spain. In April of that year Congress declared that "the people of Cuba are and of right ought to be free and independent." War was declared against Spain (See SPANISH-AMERICAN WAR), and American arms were triumphant everywhere. By the Treaty of Paris, December 10, 1898, Spain relinquished all sovereignty to Cuba. The United States temporarily occupied the island. A constitutional convention was called in 1901, and a Constitution was adopted, includ-

ing a special amendment, known as the Platt Amendment, proposed by the Congress of the United States, to guarantee that the government should never enter into any treaty with a foreign power which would impair the independence of the island; that it should not assume any debt for whose payment it could not provide; that the United States could interfere to preserve the independence of the island or to protect life, property or individual liberty; that the United States be given certain coaling and naval stations. In December, 1901, a president was elected, in the person of Tomas Estrada Palma, and on May 20, 1902, the United States formally withdrew. In 1906 an insurrection broke out headed by a defeated candidate for president. The Cuban army was powerless and social order in some provinces was almost destroyed. The United States therefore intervened and sent a commission, headed by Hon. W. H. Taft, Secretary of War, to the island. This commission tried to reconcile the opposing factions, but without success. President Palma resigned and the Cuban Congress failed to elect a successor. Thereupon Secretary Taft issued a proclamation placing the Republic under military government. Hon. C. E. Magoon was soon appointed governor, and under the control of the United States order was immediately restored. The United States government in again assuming control of the island made it very plain that the control would continue only until the people of Cuba were again in condition to proceed peaceably with a new election, and the government could be transferred to the officers thus chosen. A national election was held Nov. 14, 1908, and Gen. José Miguel Gomez was chosen president. On Jan. 13, 1909, President Gomez was inaugurated. On Jan. 13 the United States troops began to withdraw and in April the last detachment departed, leaving the Cuban Republic again under control of its own government. See SPAIN, subhead *History*; UNITED STATES, subhead *History*; SPANISH-AMERICAN WAR. Consult Ballou's *Cuba, Past and Present*, and Hill's *Cuba and Porto Rico*.

Cube, a geometric solid having six equal square faces. A cube is used as a unit of measure for volume. One *cubic inch* is a volume equivalent to a cube one inch in each of its dimensions. The volume of a cube is equal to its height a , times its width a , times its length a , or a^3 . From this circumstance the third power of a number, which is the product of a number taken three times as a factor, is called its

cube. One of the famous mathematical problems of antiquity was that of the "duplication of the cube," that is, to find a cube whose volume is twice that of a given cube. It is impossible of solution by the processes of elementary mathematics.

Cu'bebs, the fruit of species of plants belonging to the pepper family. The cubebs of pharmacy are produced by a climbing woody shrub, native of South Borneo, Sumatra, Prince of Wales Island and Java. It has round, ash-colored, smooth branches, each of which bears from forty to fifty small, globose fruits, about one-fifth of an inch in diameter. The odor of cubebs is agreeable and aromatic; the taste, pungent, acrid, slightly bitterish and persistent. (See illustration on preceding page.)

Cuck'oo, a bird common in warm countries and a summer resident in more northern lands. Altogether there are 175 species known. In the United States the rain crow or yellow-billed cuckoo is common, but it is a shy bird, keeping in the woods and flitting about quietly, uttering hoarse chucking notes which people used to



CUCKOO

say foretold rain. It is a long, slender bird of a pretty greenish-brown color and builds its flimsy nest and rears its own young. The European cuckoo, however, lays its small egg upon the ground and then picks it up and

deposits it in the nest of a smaller bird, where it is cared for by the unwilling mother (See COW-BIRD). The cuckoo of Africa and Asia is closely allied to the European cuckoo.

Cu'cumber, the familiar fruit of a vine which is closely related to the muskmelon. In southern Europe the cucumber is cooked before being used as an article of food, but in the United States it is used principally as salad or pickle. The varieties are numerous, and each has its particular value. In a wild state in tropical Asia, the cucumber is very bitter and almost poisonous, and even now it occasionally happens that a fruit is found that is bitter throughout, and almost always near the stem there is a bitter section. In southern Europe there is a curious relative of the common cucumber. This is a hairy plant which produces a small hairy fruit that falls from the vine when ripe and, through the opening where the stem grew, squirts its slime-covered seed some little distance. This is known as the *squirting cucumber*.

Cucumber Tree, a fine forest tree of the magnolia group, which grows in the United States and takes its name from the appearance of its fruit. Because of its lightness it is often used in the construction of boats.

Cuenca, *kwain'ka*, the capital of the province of Azuay, Ecuador, situated 85 mi. s. w. of Quito, on a tableland 8640 feet above the level of the sea. Among its institutions are a cathedral, a university, a school of fine arts and several convents. The chief industries near the city are mining in the rich metal deposits, agriculture and cattle raising. Hats and pottery are manufactured. The Aztecs have left interesting relics in the vicinity. Population, between 25,000 and 30,000.

Cu'fic or **Kufic**, a term derived from the town of Cufa, in the pashalic of Bagdad, applied to the written characters of the Arabian alphabet, in use from about the sixth century of the Christian era until about the eleventh. The earliest copies of the *Koran* were written in these characters.

Cul'berson, CHARLES A. (1855-), an American politician, born at Dadeville, Ala. He was the son of David B. Culberson, who was congressman from Texas for twenty-two years. He graduated from Virginia Military Institute, studied law, settled in Texas and became attorney general of the state in 1890. He was elected governor in 1894 and United States senator in 1899, to succeed Roger Q. Mills. He was reelected in 1905 and 1911.

Cullo'den Moor or **Drumossie Moor**, a heath in Scotland, near Moray Firth, 4 mi. e. of Inverness. The moor is well cultivated. Here was fought, April 27, 1746, the battle between the duke of Cumberland and the Pretender, Prince Charles Edward, which terminated the attempts of the Stuart family to recover the throne of England. The spot where the battle raged the fiercest and where many of the dead were buried is marked by a monumental cairn.

Cul'lom, **SHELBY MOORE** (1829-1914), an American statesman, born in Wayne co., Ky. He was admitted to the bar in Illinois and began his practice in Springfield, where he was soon drawn into politics and elected to the legislature and to Congress. From 1876 to 1883 he was governor of Illinois, in the latter year beginning a career of 30 years in the United States Senate as a Republican. He was an advocate of the interstate commerce law of 1889, and was one of the commissioners to establish American Government in Hawaii. In 1913 he was appointed commissioner in charge of the great Lincoln Memorial at Washington, D. C.

Cumae, *ku'me*, an ancient Greek city of Italy, in Campania, situated on the Mediterranean, 11 mi. w. of Naples and, according to Strabo, the most ancient of Greek colonies in Italy. Cumae founded Naples and, in Sicily, Messina, and for two hundred years was a very important and prosperous city. As a result of the jealousy of its power, the Etruscans waged war in 474 B. C. against Cumae, in which the Cumaeans, with the aid of Hiero of Syracuse, were successful. The city was destroyed in 1205 by the people of Naples, as it had become the center of a band of pirates, and now only a few ruins exist.

Cumana, *koo ma nah'*, a seaport city in Venezuela, situated on the Manzanares River, 100 mi. w. of Barcelona and 160 mi. w. of Caracas. This is possibly the oldest city in America, having been founded in 1520. The place is frequently visited by earthquakes and was almost entirely destroyed in 1853. It exports sugar, cocoanuts, cacao, sugar, hides, tobacco and coffee. Population, about 12,000.

Cum'berland, **MD.**, the county-seat of Allegany co., 152 mi. n. w. of Washington, on the Potomac River and on the Baltimore & Ohio, the Cumberland & Pennsylvania and other railroads. It is the trade center of the Cumberland and Georges Creek coal district and in population and importance is the second city of the state. The industries include paper mills, glass works, tanneries, flour mills, steel and iron works and

railroad repair shops. The place was laid out in 1785 on the site of Fort Cumberland, which was erected at the outbreak of the French and Indian War. Cumberland was incorporated as a city in 1850. Population in 1910, 21,839.

Cumberland, R. I., a town in Providence co., 6 mi. n. of Providence, on the Blackstone River, and on the New York, New Haven & Hartford railroad. It has large manufactures of horse-shoes and cotton goods. The town was incorporated in 1747. Population in 1910, 10,107.

Cumberland Mountains, **THE**, a part of the Appalachian system. The several ridges of these mountains extend from West Virginia along the boundary of Virginia and Kentucky, across Tennessee into Alabama and form a plateau about 50 miles wide. They rarely exceed 2000 feet in height. They are covered with good timber, but the soil is not very rich. See **APPALACHIAN MOUNTAINS**.

Cumberland River, a river which rises in Kentucky in the Cumberland Mountains, flows nearly westward into Tennessee, where it makes almost a semicircle, returns into Kentucky and finally empties into the Ohio at Smithland. It is about 650 mi. long. It is navigable for steamboats to Nashville, nearly 200 mi. from its mouth.

Cumberland Road, a road constructed by the United States government, extending from Fort Cumberland, Md., to Vandalia, Ill., a distance of 800 miles. It was begun about 1806 and was finished about 1840. It was for years under Federal control and was commonly called the Great National Pike, but by 1856 each state through which it passed was controlling the section within its borders. It played an important part in opening the West to settlement and was for years the chief avenue of westward migration.

Cummins, **ALBERT BAIRD** (1850-), an American lawyer and statesman, born at Carmichaels, Pa. He practiced law in Chicago from 1875 to 1878, when he removed to Des Moines. Here he became prominent in Republican politics, and from 1902 to 1908 was governor of Iowa. He achieved fame as an earnest advocate of tariff revision by the Republican party, a policy known for a time as the "Iowa idea." In 1908, on the death of Senator Allison, he became United States senator, and at the election in 1909 was reelected for the full term. He was prominently mentioned as a candidate for the vice-presidency on the Republican ticket in 1908, and in 1912 was an active candidate for the nomination for president.

Cunard', SAMUEL, Sir (1787-1865), an English capitalist, founder of the Cunard line of steamers, which was the first line to establish regular steamship communication between England and the United States.

Cuneiform, *ku ne'i form*, **Inscriptions**, the name applied to the wedge-shaped characters of the inscriptions on old Babylonian and Persian monuments, sometimes also described as arrow-headed or nail-headed characters. These characters appear to have been originally of the nature of hieroglyphs and to have been invented by the primitive Accadian inhabitants of Chaldea, from whom they were borrowed, with considerable modification, by the conquering Babylonians and Assyrians, who were Semites by race and spoke an entirely different language. The use of the cuneiform characters, however, ceased shortly after the reign of Alexander the Great; and after the lapse of nearly two thousand years it was doubted by many if the signs had ever had an intelligible meaning. They were even regarded by some as the work of a species of worm, by others as mere talismanic signs or astrological symbols. Gradually, however, through the efforts of Grotefend, Lassen, Rawlinson and other investigators, the means of translation were perfected. Many of the inscriptions first discovered are in three different languages and in as many varieties of cuneiform writing. The most prominent, and at the same time the simplest and latest of these, is the Persian, with about sixty letters. Next older in time and much more complex is what is designated as the Assyrian or Babylonian system of writing, consisting of from six hundred to seven hundred characters, partly alphabetic, partly syllabic. Lastly comes the Accadian inscriptions, the oldest of all, originally proceeding from a people who had reached a high state of civilization three thousand years before Christ and whose language ceased to be a living tongue about 1700 B. C. The most celebrated trilingual inscription is that at Behistun, cut upon the face of a rock seventeen hundred feet high, recording a portion of the history of Darius. The British Museum contains many thousands of inscribed clay tablets, cylinders, prisms and the like, the decipherment of which is still in progress. See ASSYRIA.

Cupid, according to classic mythology, the god of love. He was the son of Mars, the god of war, and Venus, the goddess of love. His attributes were the bow, quiver and wings, and he was represented in painting and sculpture

as a chubby child with gauzy wings and roguish, dimpled face. Cupid loved a fair mortal princess, Psyche, who after many trials was granted immortality by the gods. As Cupid is the emblem of the heart, his love, Psyche, is the symbol of the soul. See PSYCHE.

Cu'pola, in architecture, a spherical, dome-like vault, on the top of an edifice, so called because of its resemblance to a cup. The Italian word *cupola* signifies a hemispherical roof which covers a circular building, like the Pantheon at Rome and the Round Temple of Vesta at Tivoli. The term is also applied distinctively to the concave interior, as opposed to the dome, which is the entire curved structure. The term cupola is commonly, though incorrectly, applied to any small dome-lantern or observatory projecting above a roof. See DOME.

Curaçao, *koo ra sah'o*, or **Curaçoa**, *koo ra so'*, **Island**, one of the Dutch West Indies, 40 mi. from the coast of Venezuela. It has an area of about 210 sq. mi. Its surface is usually low, with lagoons and coral reefs along its coasts. Agriculture is backward, owing to the lack of rain, but fruits, tobacco, corn, sugar cane and vegetables are raised. Phosphate of lime and sea salt are the principal minerals. The Dutch colony of Curaçao includes Curaçao, Buen Ayre, Oruba, Saint Martin, Saint Eustache and Saba. The governor and council, appointed by the king of the Netherlands, live at Willemstad, the capital, on the Bay of Saint Anna. Population of the colony in 1909, 52,741, and of the island of Curaçao, 30,930.

Curaçao or **Curaçoa**, a liquor or cordial prepared from a peculiar kind of bitter oranges growing in Curaçao, which have a persistent aromatic odor and taste. It is prepared from the yellow part of the rind, which is steeped in strong alcohol, the infusion being afterward distilled, purified and mixed with syrup. For the true orange, the common bitter orange of Europe is often substituted, and the genuine deep-yellow color is imitated by caramel.

Curas'sow, a name given to a bird closely related to the crows or partridges. The crested curassow is found in Guiana, Mexico and Brazil and is a handsome bird, nearly as large as a turkey and more noble in appearance, being of a dark violet color with a purplish-green gloss above and on the breast. The abdomen is snowy white and the crest is golden. See GUAN.

Curfew, the ringing of a bell at a certain hour of the evening, usually eight o'clock, to indicate that all outdoor occupations must cease

and that people must remain within doors. The custom was common during the Middle Ages and was introduced into England by William the Conqueror. The law was repealed by Henry I in 1103, but the bell continued to be rung in many districts to modern times and probably may still be heard. Similar ordinances for keeping children off the streets have been passed in some American cities.

Curie, *ku re'*, PIERRE (1859–1906), and MARIE SKŁODOWSKA (1867–), French scientists, the discoverers of the wonderful properties of radium. Professor Curie was born in Paris, was educated at the Sorbonne, and later became professor of physics there. In 1898, after several years of investigation, Curie and his wife announced the existence of radium. In 1903 they were awarded the Davy Medal of the Royal Society and one-half of the Nobel prize in physics. After the death of her husband in 1905, Madame Curie, a Polish woman educated in Paris, succeeded him as professor of physics at the Sorbonne, and in 1911 her further researches won for her the Nobel prize in chemistry.



MADAME CURIE

Cur'lew, a genus of birds belonging to the same family as the snipe and woodcock. The birds have long, slender, partly naked limbs, short, rounded tails and very long, slender bills. The American species, which is common east and south, has a bill sometimes eight inches long that curves downward at the tip and is covered with a sensitive skin, which enables it to detect its food in the mud.

Curl'ing, a favorite Scottish winter amusement, played, also, to some extent in the United States. Large, smooth stones having somewhat the shape of a flattened hemisphere, with an iron or wooden handle at the top, and from 30 to 45 pounds in weight, are slid along a prepared course on the ice. The object of the player is to lay his stone as near to the mark as possible, to guard that of his partner which has been well laid before or to strike off that of his antagonist. Each player throws two stones, and then the count is made and the play resumed from the other end of the course. A series of match games is called a *Bonspiel*. Some of the international and interstate matches attract large numbers of people.



CURLING STONE

Cur'rant, the name of two well-known shrubs cultivated in gardens for their fruit. The red currant, which is used principally for jellies, is a native of southern Europe, Asia and Americas. The white currant is a cultivated variety of the red. The black currant, native to most parts of Europe and found abundantly in Russia, has a strong taste and odor, but it is used for jelly and in making tarts and puddings, to which it adds excellent flavor. The dried currants of commerce are really raisins, a small variety of grape, which originally came from Corinth and therefore received the name of currant.

Cur'rency, the medium of exchange by which the processes of trade are transacted. The terms *currency* and *money* are used synonymously, but there is a technical distinction. In using the term *currency*, emphasis is laid upon the characteristic by which it becomes a medium of exchange, while money includes not only this characteristic but also other functions, such as being a measure of value and a standard of value (See MONEY). In common speech, also, the term *currency* is restricted chiefly to representative money, or paper money, and the problem of the adjustment of the currency, so-called, has to do chiefly with the relation of these representative forms of money to the standard money. Thus, the circulating medium in the United States comprises at least nine different classes of money, of which only the gold coin may be considered to have all the essential attributes of money. The others are gold certificates, silver certificates, standard

silver dollars, silver subsidiary coins, minor coins of various metals, treasury notes (by the law of 1890), United States notes, national bank notes. Of these the gold and silver certificates represent a quantity of money equal in amount to the issues of the certificates deposited in the United States treasury for the express purpose of redeeming the certificates when due. They are not full legal tender. The United States notes are convertible into gold on demand, but the reserve of gold held to redeem them is not equal to the total issue of the notes, being usually about \$150,000,000, which is ordinarily sufficient to meet the demands for the redemption of the notes. The treasury notes of 1890 were issued under the Sherman Bill, in payment for silver bullion bought between the passage of the bill and its repeal in 1893. They were expressly made legal tender by the law and are redeemable in gold. The national bank notes are issued by the national banks to an amount equal to the value of government bonds or of gold bullion deposited in the treasury to secure them. They pass at par throughout the country and are payable to the government for all debts except customs duties; the government may pay its debts in them, excepting the interest on the public debt and the redemption of its own notes. They are therefore to a certain extent government currency, but they are not legal tender.

Checks and drafts upon banks are in a sense currency, to the extent to which they are received in the payment of debt in the community, but they have no legal status as currency.

Paper, or representative, currency, differs from standard currency in that its issue is not considered purely a governmental function. The government may constitute itself the sole issuer of such money, or it may grant the privilege to corporations, companies or private individuals, and this right has been used at different times in history. One essential for the safe issue of such money is that it shall be secured by such deposits of real money or of other articles of equivalent value that the community shall have confidence that it will be redeemed on demand. See BANKS and BANKING; COINING; MONEY.

Cur'rents, OCEAN, streams of water, or drifts, flowing regularly through the sea. According to their position currents are classified as *deep sea currents*, *surface currents* and *drift currents*, and according to their temperature as *warm* and *cold*. Marine currents are very numerous, and taken together they constitute an oceanic circulation which secures a complete

interchange of waters in each of the great branches of the ocean, as the Atlantic, Pacific and Indian oceans. Many theories have been advanced to account for the existence of these currents. It is now generally conceded that oceanic currents are due to the difference in temperature of the water in different localities, and to winds. Water contracts as it cools until it reaches the temperature of 39° F. Because of this, water in the polar regions is heavier than that in the equatorial regions. This heavy cold water tends to settle to the bottom of the ocean and the continuous settling forces the water below to move forward. Thus there is developed a deep sea current in each of the oceans, moving slowly from the polar to the equatorial regions. As these currents move to the warmer regions they become warmer and gradually rise, coming to the surface within the tropics. Surface currents counter to these flow from the tropics towards the poles. These are currents of warm water. The best illustration of them is the Gulf Stream in the North Atlantic and the Kuro Sivo, or Japan Current, of the North Pacific. See GULF STREAM; KURO SIVO.

Were it not for the rotation of the earth these currents would take a due north and south course, except where their direction was changed by coming in contact with islands or other obstructions in the bed of the ocean; but because of the rotation the currents moving from the equatorial towards the polar regions are deflected eastward and those moving in the contrary direction are deflected westward. For this reason warm currents usually strike the western coasts of the continents and cold currents the eastern. The effect of these currents upon climate is seen in comparing the climatic conditions of places with the same latitude on the Atlantic and Pacific coasts of the United States. The warm climate of northern Europe is due partly to the warm currents of air blowing over that region from the Atlantic, and these winds become warm by blowing for a long distance over the waters of the Gulf Stream.

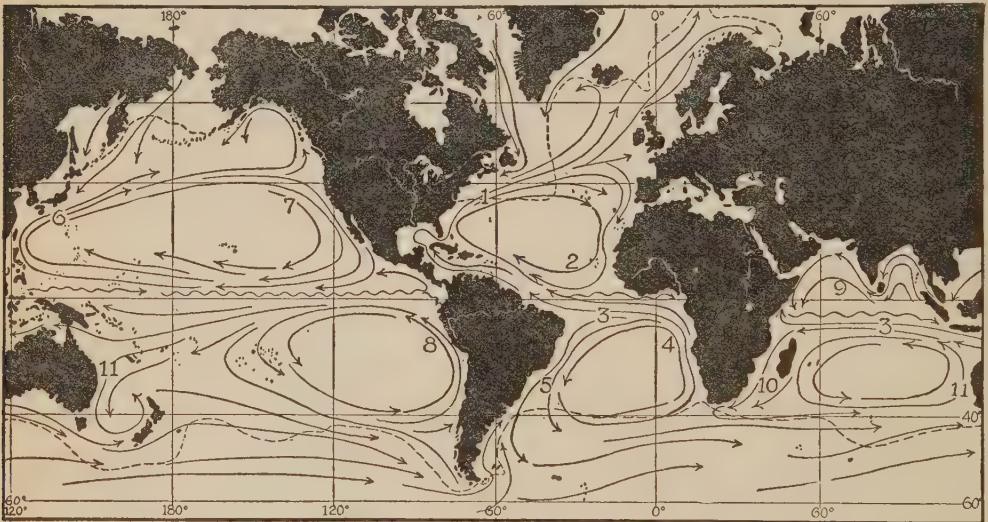
In the equatorial regions surface currents flow westward. When these currents strike the eastern coasts of the continents, they divide, a portion going northward and a portion southward, so that in the Atlantic and the Pacific oceans there are practically two systems of currents, those in the North and South Atlantic and those in the North and South Pacific. Because of the shape of the latter ocean, the currents in the South Pacific are less marked

than those in each of the other localities. In the center of each of these areas is a large tract of water in which there are either no currents or currents of a very low velocity. In the North Atlantic this region is characterized by the gathering of large quantities of seaweed, and it is often known as the Sargasso Sea. *Drift currents* are those broad, general movements of water in the open ocean, in which the water over a large area turns slowly in one direction. They are well illustrated by the drift of the Antarctic Ocean northward and the drift in the southern part of the Indian Ocean.

Curry, Jabez Lamar Monroe (1825-1903), an American statesman and educator, born in

Richmond College, Virginia, but upon the death of Barnas Sears was chosen agent of the Peabody Educational Fund, and as the administrator of this and the Slater Fund he gained his widest and most enduring reputation. During President Cleveland's second administration Doctor Curry was United States minister to Spain. See **PEABODY EDUCATIONAL FUND**; **SLATER FUND**.

Cur'tin, Andrew Gregg (1817-1894), an American statesman, born in Bellefonte, Pa. He was educated at Dickinson College, engaged in the practice of law, entered politics and was elected governor of Pennsylvania in 1860. During the Civil War his prompt and efficient



OCEAN CURRENTS

- | | | |
|------------------------|------------------------|----------------------|
| 1—Gulf Stream. | 4—Benguela Current. | 7—California Current |
| 2—Canary Current. | 5—Brazilian Current. | 8—Peruvian Current. |
| 3—Equatorial Current. | 6—Japan Stream. | 9—Monsoon Current. |
| 10—Mozambique Current. | 11—Australian Current. | |

Lincoln co., Georgia, and educated at the University of Georgia and the law school of Harvard University. He began his work as a lawyer, served in the Mexican War, became a member of the Georgia legislature and later of the national House of Representatives. At the breaking out of the Civil War, he joined his state in the secession movement and was a member of the Confederate congress, where he took a prominent part in drafting the constitution of the Confederate States. At the close of the war, Doctor Curry entered upon an educational career and became president of Howard College, Alabama. He was later presi-

dent of Richmond College, Virginia, but upon the death of Barnas Sears was chosen agent of the Peabody Educational Fund, and as the administrator of this and the Slater Fund he gained his widest and most enduring reputation. During President Cleveland's second administration Doctor Curry was United States minister to Spain, and he sat in Congress as a Democrat from 1881 to 1887.

Curtis, George William (1824-1892), an American writer, orator and publicist, born in Providence, R. I. He was a member of the Brook Farm Community for eighteen months, and after leaving there he traveled for a time in Europe and the Orient. For years he was editor of *Putnam's Monthly*, and he began in 1853 the "Editor's Easy Chair" papers in *Harper's Monthly*. On the establishment of *Harper's*

Weekly he became one of its editors. During the later slavery struggle he worked earnestly, through the press and from the platform, for the cause of liberty. After the Civil War he devoted himself to reform movements, especially civil service reform, in the agitation of which he was long the most conspicuous figure. All his works, both his addresses and his purely literary productions, are marked by grace of diction, dignity and high moral sentiment. A novel, *Trumps*, and many of his other books appeared first in periodicals. Perhaps the best known of his writings is *Prue and I*.

Curtius, *koor'tse oos*, ERNST (1814-1896), a German archaeologist and historian, born at Lübeck. After studying at Bonn, Göttingen and Berlin, he traveled in Greece, but returned in 1841 to Germany, where he became lecturer of the University of Berlin and tutor to the crown prince, who was afterwards Frederick III. His *Classical Studies*, *Twelve Attic Inscriptions* and *The Acropolis of Athens* brought him great renown, and in 1844 he was made a member of the Royal Academy of Sciences. After having filled the chair of classical archaeology and philology at Göttingen, he returned to Berlin in 1868 as professor of ancient history and director of the department of antiquities in the Royal Museum. His interest in the ruins of Olympia gained him the support of the German government in his plans for carrying on his excavations there. His investigations and discoveries have been especially valuable and have contributed much to our knowledge of Greek antiquities. Curtius was one of the foremost of German scholars and one of the most prominent teachers of his day. Besides his numerous lectures, pamphlets and treatises, he wrote the following works: *The Peloponnesus*, *History of the City of Athens* and, in collaboration with Adler and Hirschfeld, *The Excavations at Olympia*.

Cu'rule Magistrates, in ancient Rome, the highest dignitaries of the state, distinguished by enjoying the privilege of sitting on ivory chairs when engaged in their public functions. They were the consuls, praetors, censors and chief aediles.

Curve, a line which changes its direction at every point. Every curve can be represented by an algebraic equation containing two variable unknown quantities, the position of the points of the curve with reference to coördinates (See COORDINATES) being determined by the values of these unknowns. Curves are said to be of the

first, second, third, etc., order, according as the unknown quantities in their corresponding equations are raised to the first, second, third, etc., powers. Thus, the equation representing a circle will contain two unknown quantities, each raised to the second power, and the circle is said to be a curve of the second order.

Cur'zon, GEORGE NATHANIEL, Lord (1859-), an English diplomat and statesman, born at Kedleston and educated at Baliol College, Oxford. He first became private secretary to the marquis of Salisbury. After this he sat in Parliament for twelve years, and during a portion of the time he was under secretary of state for India and during the remaining portion was under secretary of state for foreign affairs. In 1898 Lord Curzon was appointed viceroy and governor general of India, which position he held until 1905. His administration was characterized by energy and ability and was notable for the aid which he gave to education in the Empire, the strengthening of the military forces and his open opposition to the encroachments of Russia upon English territory in the East. He is the author of *Russia in Central Asia*, *Persia and the Persian Question* and *Problems of the Far East*.

Cus'cus, a genus of animals, of the phalanger family, native to the islands of the Australian group and New Guinea. The cuscus somewhat resembles the opossum, having dense, woolly fur and a prehensile tail. It is sought by the natives for its fur and flesh.

Cush'ing, CALEB (1800-1879), an American statesman and diplomatist, born in Salisbury, Mass. After graduating at Harvard in 1817, he was tutor of mathematics and natural philosophy there until 1819 and was admitted to the bar in 1822. In 1825 he served in the legislature and ten years later was elected to Congress, where he served until 1843. Cushing was nominated by Tyler for secretary of the treasury, but he was rejected by the Senate. In 1843 he was appointed commissioner to China and negotiated the first treaty between that country and the United States, which was ratified in 1845. He served in the Mexican War, becoming brigadier general, and in 1852 he was appointed an associate justice of the supreme court of Massachusetts. The next year he was made United States attorney general. In 1870 he prepared the protocol of the Treaty of Washington and afterward the statement to be laid before the tribunal of arbitration in Geneva. In 1873 he was nominated as chief justice of the United

States, but was not confirmed by the Senate, and in the same year he was made minister to Spain. He was the author of *Reminiscences of Spain: The Country, Its People, History and Monuments*, and *Historical and Political Review of the Late Revolution in France*.

Cushing, THOMAS (1725-1788), an American statesman, born in Boston. He took an active part in the pre-Revolutionary discussion and was elected to the first and second Continental Congresses and, though opposing the Declaration of Independence, supported the American cause with energy. He was considered in England the leader of the Revolution, and his ability and services were held in high regard in America.

Cushing, WILLIAM BARKER (1842-1874), an American naval officer, born at Delafield, Wis. He graduated from the naval academy at Annapolis in 1861 and immediately entered the navy, where he soon became conspicuous for his gallantry, his most notable feat being the destruction of the Confederate ram *Albemarle*, October 27, 1864, in Plymouth Harbor, N. C. For his service he was made lieutenant commander. After the war he served in the Pacific and Asiatic squadrons and in 1872 was commissioned commander.

Cush'man, CHARLOTTE SAUNDERS (1816-1876), an American actress, born in Boston. She made her first appearance in opera and scored a distinct success, but the loss of her voice decided her to study for the drama. Her first rôle was Lady Macbeth, which remained throughout her career her greatest part. Among her other rôles were Juliet, and Meg Merrilies in Scott's *Guy Mannering*. Although most famous in tragedy, she was very successful, also, in such rôles as Lady Teazle. She retired from the stage in 1875.

Cushman, PAULINE (1833-1893), a spy, born in New Orleans, La. At first she was a variety actress. When the war began she was employed by the United States government as a detective of Southern sympathizers in Louisville, Ky. For some time she posed in the Southern states as a Confederate sympathizer, but remained steadfast to her affiliations with the national government. Eventually she was captured as a Northern spy, court-martialed and sentenced to be hanged. But when the Confederates left Shelbyville she was left behind and was released by entrance of the Union army.

Cus'ter, GEORGE ARMSTRONG (1839-1876), an American soldier born in New Rumley, Ohio. He graduated from West Point and at the out-

break of the Civil War was given a commission in a cavalry regiment. Sent from Washington with dispatches to General McDowell, he arrived at the front in time to take part in the first Battle of Bull Run. General McClellan was so impressed by his energy and bravery that he appointed him aid-de-camp. Captain Custer took the first colors captured by the Union army. In 1863 he was appointed brigadier general of volunteers, and he gained the rank of major the same year. For gallantry at the Battle of Winchester he was made brevet colonel and major general of volunteers. He served on the plains from 1866 to 1871, was stationed for two years with his regiment in Kentucky and was then sent to Dakota in an expedition against the Sioux. In June, 1876, General Custer with his whole command was defeated and slain on the Little Big Horn, by the confederate Sioux under Sitting Bull. The spot has become a national cemetery.

Cus'tis, GEORGE WASHINGTON PARKE (1781-1857), an American author, the grandson of Martha Washington and the adopted son of George Washington. He became a fluent speaker, wrote plays for his own amusement and published *Recollections of Washington*. His daughter married Robert E. Lee.

Customs Duties, the taxes levied upon goods passing from one country to another. The system of customs duties dates probably as far back in history as ancient Greece, though the name is of comparatively recent origin. This arose in the long conflict between the crown and Parliament over the right of taxation. To meet the claims made by the House of Commons to the exclusive right to vote all supplies, it used to be maintained that there were certain duties on exportation and importation to which the crown had acquired a right by *custom*; and the name thus acquired was retained after the power claimed by the lower branch of Parliament had been settled by permanent legislation. The first customhouse was erected in London in 1304.

Customs duties are now seldom levied on exports, so that the term is practically synonymous with *import duties*. They are of two kinds, *specific*, that is, reckoned by unit of quantity (weight or number), and *ad valorem*, reckoned by unit of value. The former are far more easily assessed and collected. A bitter controversy has always been waged over the expediency of customs duties between the advocates of absolutely *free trade*, those who wish to have no impediment to the free transfer of

goods, and the *protectionists*, who wish to set up duties, by which to exclude foreign goods from competition with those of home production (See **TARIFF**; **FREE TRADE**).

Upon the organization of the United States government after the close of the Revolution, the system of customs duties then in operation in England was adopted with scarcely any modification, under the direction of Alexander Hamilton, the first secretary of the treasury. Among the especial features of the system was that of debentures, or drawbacks, which were certificates entitling an exporter of imported goods to a rebate of duties paid on their importation, and also to re-export them to foreign ports. Subsequently the object thereby accomplished was more directly facilitated by permitting the importer to "bond" his goods in government warehouses until he was able to pay the duties; and later on the practice was modified still more in favor of the importer by permitting him to take out of "bond" from time to time portions of the invoice of goods consigned to him, paying the proportionate amount of duties. This system of bonded warehouses, which is now a feature of the customs service in every civilized country of the world, was embodied in an act of Congress passed in 1846, known as the Walker act.

The first customhouse in the United States was established in New York City in 1799, under an act of Congress passed the previous year. The ten customhouses which render the largest returns to the United States government are, in their order, New York, Boston, Philadelphia, San Francisco, Chicago, Baltimore, New Orleans, Saint Louis, Detroit and Tampa, Florida.

The net revenues received by the government through the customhouses of the country since the organization of the revenue system are as follows:

From 1791 to 1800	\$ 50,321,485.87
" 1801 to 1810	129,540,517.63
" 1811 to 1820	163,804,167.09
" 1821 to 1830	198,523,207.69
" 1831 to 1840	204,703,913.92
" 1841 to 1850	243,666,681.78
" 1851 to 1860	544,980,470.30
" 1861 to 1870	1,239,458,442.34
" 1871 to 1880	1,663,973,043.74
" 1881 to 1890	1,992,600,748.76
" 1891 to 1900	1,824,538,519.00
" 1901 to 1905	1,300,844,840.00
" 1906 to 1910	1,551,663,150.00
" 1911 to 1913	944,710,139.00

[NOTE.] In accordance with an act passed by Congress in 1842, the fiscal year since that time has begun on the first of July. Therefore the decade from 1841 to 1850, in the above list, embraces only nine and a half years.

Cuticle, *ku'ti kl*. See **SKIN**.

Cut'ler, MANASSEH (1742-1823), an American clergyman, botanist and pioneer. He was born in Killingly, Ky., was educated at Yale and was admitted to the bar. Later he studied theology, was ordained as a preacher and during the latter part of the Revolution served as chaplain of a Massachusetts regiment. He gained note by careful study and classification of the flora of New England. After the Revolutionary War he represented a company of veterans in making a contract with Congress for the purchase of 1,500,000 acres of land in the Northwest Territory and was probably the author of the first draft of the Ordinance of 1787 (See **ORDINANCE OF 1787**). In 1788 he took a prominent part in the settlement of Marietta, Ohio, but returned to Massachusetts and sat in Congress from 1801 to 1805.

Cut'lery, a term applied to all cutting instruments made of steel. The finer articles, such as the best scissors, penknives, razors and lancets, are made of cast steel. Table knives, plane irons and chisels of a very superior kind are made of shear steel, while common steel is wrought into ordinary cutlery. One of the commonest articles of cutlery, a common razor, is made as follows: The workman, being furnished with a bar of cast steel, forges his blade from it. After being brought into true shape by filing, the blade is exposed to a cherry-red heat and instantly quenched in cold water. The blade is then tempered by first brightening one side and then heating it over a fire free from flame and smoke until the bright surface acquires a straw color. The blade is again cooled and is then ready to be ground and polished.

Cut'tlefish, the common name for certain mollusks, generally applied to the particular species from which sepia is prepared (See **SEPIA**). A small shell or bone, sometimes called the *pen*, is inside the animal, and this is the cuttlefish bone placed in bird cages. When a cuttlefish is pursued and in danger of being captured, it throws out from a bag a black substance which makes a cloud and enables the animal to escape. All cuttlefish are marine animals, and in the tropics some very large specimens have been taken.

Cuvier

Cuvier, *koo vya'*, GEORGE LEOPOLD CHRETIEN FREDERIC DAGOBERT, Baron (1769-1832), a distinguished modern naturalist, born at Montbéliard. His lectures on natural history, distinguished not less for the elegance of their style than for profound knowledge and elevated speculation, were attended by all the accomplished society of Paris. In 1800 he was made professor of natural history in the College of France. Under Napoleon, who fully recognized his merits, Cuvier held important offices in the department of public instruction. In 1819 he was received among the forty members of the French Academy. Among his best-known works are *An Elementary Table of Animals*, *Lessons in Anatomy* and *The Animal Kingdom*.

Cuyler, *ki'lur*, THEODORE LEDYARD (1822-1909), a Presbyterian clergyman, born at Aurora, N. Y. He graduated at Princeton and at Princeton Theological Seminary, and after filling three other pastorates was pastor of a Presbyterian church in Brooklyn from 1860 to 1890. When he resigned to take a ministry at large, the church gave him a purse of \$30,000. He preached afterward in many places, wrote hundreds of articles in religious papers and was the author of many religious works.

Cuzco, *koos'ko*, an inland city of Peru, capital of a department of the same name, situated in a valley about 11,300 feet above sea level. Among the fine buildings are a college, a museum, a university and a convent and cathedral, which are the finest in South America. An extensive trade in sugar, gold and silver work, cotton and woolen goods and embroidery is carried on. Cuzco was founded in 1020 and was at one time the capital of the Incas. It was taken and destroyed by Pizarro in 1535. Population, estimated, about 15,000.

Cyanogen, *si an'o jen*, a compound of carbon and nitrogen. It is a gas of a strong and peculiar odor and burns with a rich purple flame. It is highly poisonous. It unites with oxygen, hydrogen and most non-metallic elements, as well as with the metals, forming cyanides. Combined with hydrogen it forms prussic acid, which is the most powerful poison known.

Cyclometer, *si an om'e tur* (measurer of blue), the name of an instrument invented by Saussure for ascertaining the intensity of color in the sky. It consists of a circular piece of metal or pasteboard, with a band divided by radii into fifty-one portions, each of which is painted with a shade of blue, beginning with the deepest, not distinguishable from black, and

Cyclometer

decreasing gradually to the lightest, not distinguishable from white. The observer holds this between himself and the sky, turning it gradually round till he finds the tint of the instrument exactly corresponding to the tint of the sky.

Cybele, *sib'e le*, originally a Phrygian goddess, whose worship was later introduced among the Greeks and Romans. She was considered to be the mother of Jupiter and was represented as a stately matron, often crowned with towers, seated on a throne, with a lion at her side. In her attributes she was practically the same as Rhea, for she symbolized the fruitfulness of the earth, and might by her favor grant bounteous harvests to her worshipers.

Cycads, *si'kadz*, a family of plants resembling palms or ferns in their general appearance, but more nearly related to the pines. The leaves are large and pinnate and usually rolled like a crozier when in bud. All are natives of the tropics, and many are handsome plants. Fossil remains show that cycads are trees of great antiquity and that they once formed a much larger part of vegetation than they do at the present day.

Cyclades, *sik'la deez*, the group of islands in the Grecian archipelago lying southeast of Greece, in the possession of Greece, forming a separate province. The largest islands belonging to this group are Andros, Paros, Tenos, Delos, Naxos and Rhenea. The islands are mountainous and have productive soil. Grapes and olives are raised, and fishing is one of the most important occupations of the people. Hermopolis is the principal trade center and is situated on the island of Syra. Much valuable building stone, including marble, is obtained from the Cyclades. Population in 1907, 134,747.

Cyclamen, *sik'lah men*, a genus of primrose-like, bulbous plants, natives of Europe and Asia, but now commonly grown in the United States. They are all herbs, with handsome, white, rose-colored or purplish flowers, and are favorite greenhouse plants. The leaves, which are large, heart-shaped and variegated in color, add much to the beauty of the plant. The flowers are scentless.

Cycling, *si'kling*. See BICYCLE.

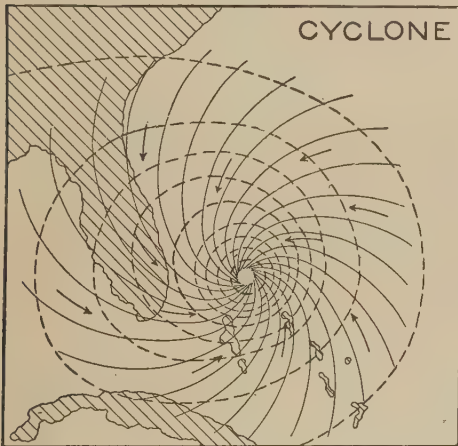
Cyclometer, *si klom'e tur*, a machine attached to a wheel to measure and record the distance



CYCLAMEN

traveled. Originally cyclometers were used on coaches and carriages, but now they are practically confined to bicycles and automobiles. The common bicycle cyclometer consists of a small cylindrical box containing a system of clockwork and a dial. This is usually attached to the fork of the wheel, so that a cam on a spoke will cause the clockwork to move every time the wheel makes a revolution. The distance traveled by the wheel in making the revolution being known, the number of revolutions necessary to measure a mile are easily determined. In a bicycle of the usual size 733 revolutions constitute a mile. By means of the wheelwork every five miles and ten miles are registered until one hundred or more are reached, when the registration begins over again.

Cyclone, *si'klone*, a circular, or rotary, storm or system of winds, varying from 50 to



500 miles in diameter and revolving around a center, which advances at a rate that may be as high as 40 miles an hour and towards which the winds tend. The term is popularly, however, applied only to a storm having great force, such as a tornado. Cyclones of greatest violence occur within the tropics. Two storms in different hemispheres revolve in opposite directions. In the southern hemisphere the direction of a storm is like that of the hands of a clock, and in the northern hemisphere it is opposite to that of the hands of a clock. The cyclones of the West Indies are described in the article HURRICANE. An *anticyclone* is a storm of opposite character, the general tendency of the winds being away from the center. The anticyclone usually follows the cyclone and produces fair weather. Cyclones are preceded by a singular calm and

a great fall of the barometer. Nearly all storms are cyclonic in their nature, but in the temperate regions the movements are so mild that the rotary motion of the storm is lost sight of except by trained observers of the weather bureau. See STORMS; TORNADO.

Cyclops, *si'klops*, in Greek myths, a fabled race of one-eyed giants, the sons of Uranus and Ge (Heaven and Earth), slain by Apollo. They were usually represented as a numerous race living in Sicily and rearing cattle and sheep, but later traditions describe them as the servants of Vulcan working under Aetna and engaged in forging armor and thunderbolts.

Cydnus, *sid'nus*, a river in Cilicia, rising in the Taurus Mountains and emptying into the Mediterranean. It was anciently celebrated for the clearness and coolness of its waters.

Cylinder, *sil'in dur*, a geometrical solid, which may be generated by the revolution of a rectangle about one of its sides. Its surface, exclusive of its bases, is equal to the circumference of one base multiplied by the perpendicular distance between the bases. Its volume is equal to the area of one base multiplied by the distance between the bases.

Cyma, *si'mah*, in architecture, a wavy molding, the profile of which is in the form of the letter S, either concave at top and convex at bottom, or the reverse. It is practically the same as the modern ogee molding.

Cymbals, *sim'balz*, two circular hollow plates of brass, used as musical instruments, being held one in each hand and struck sharply together. They are of very ancient origin.

Cymri, *kim'ri*, a branch of the Celts, which appears to have succeeded the Gaels in the great migration westward, and to have driven the Gaelic branch into Ireland, the Isle of Man and the Highlands of Scotland, while they themselves occupied the southern parts of Britain. At a later period they were themselves driven out of the Lowlands of Britain by the invasions of the Angles, Saxons and Jutes and were compelled to take refuge in the mountainous regions of Wales, Cornwall and the northwest of England. Wales may now be regarded as the chief seat of the Cymri.

Cynics, *sin'iks*. See CYNIC SCHOOL OF PHILOSOPHY, THE.

Cynic School of Philosophy, THE, founded in the first half of the fourth century B. C., developed a system of doctrines based upon the principle that virtue is the only good. As defined by Antisthenes, virtue is practically a

Cypress

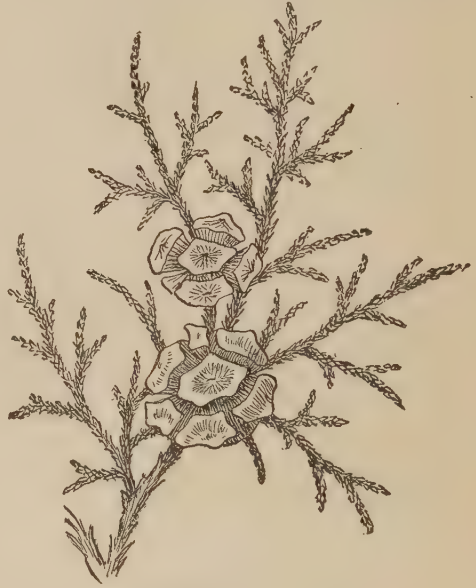
wise direction of life, and of itself it constitutes happiness. Since continued happiness is not possible if wants and desires which may not be satisfied are regarded, virtue consists in living, as much as possible, in independence of disturbing wishes. The simplest, most natural life is desirable. Art, literature, science, wealth, honor, pleasure and all other products or accompaniments of civilization, as well as family and other social relations, are to be discarded, because they give rise to wants that cannot be satisfied and to circumstances that cannot be controlled. One should be bound by loyalty to no particular state or society. Knowledge or science is valuable only as it makes possible an intelligent government of the individual's actions. The most ardent follower of this school was Diogenes, by whom its doctrine was carried to ridiculous extremes in the ordinary affairs of life. A *cynic* is one who, governed to a greater or less extent by the doctrines of this school, disbelieves in or doubts the wisdom of social usages, or of personal character or motives, and expresses his doubts by sarcasm or sneers.

Cypress, *si'pres*, a genus of cone-bearing trees, distinguished by their small, dark, evergreen, opposite leaves and their tiny, solitary flowers. The best-known species is the *common cypress* of Europe, which is a dark-colored evergreen, with extremely small leaves, which entirely cover the branches. It has an almost quadrangular shape, except at the top, where it becomes pyramidal. Cypress trees are rather dark and somber in appearance and have long been used for decorative purposes in cemeteries; and branches of cypress were formerly worn at funerals as emblems of mourning. The wood is hard, compact and durable and has a reddish color and pleasant odor. The *bald cypress*, common to the swamps of the Southern states, is a deciduous tree and one of the most valuable of timber trees. Although the wood is soft, its remarkable durability under water makes it of great value, and the size of the tree furnishes timbers of large size. In the regions where the tree grows to best advantage, it forms great forests, covering many square miles of territory. A peculiar feature of the tree is the development upon its roots of peculiar knots, or growths, called *knees*, which sometimes reach a height of ten feet and when fully grown have their tops above the water. It is not well understood of what use these knees are to the trees. In the United States the annual lumber cut of cypress

Cyprus

amounts to nearly 1,000,000,000 feet and is valued at more than \$20,000,000.

Cyprus, *si'prus*, an island lying south of Asia. It is the most easterly island in the Mediterranean Sea. Its greatest length is 145 mi., its breadth is about 60 mi., and its area, 3584 sq. mi. The chief features of the surface of Cyprus are two mountain ranges, both stretching east and west.



CYPRESS LEAVES AND CONES

The one running close to the northern shore and extending through the long northeastern horn, or prolongation, of the island, never rises to a height exceeding 3200 feet. The southern range is loftier and is known as Olympus. The highest summit is Mount Troödos, whose height is about 6500 feet. The mountains are covered with forests of excellent timber, now under government supervision. The climate varies in different places; it is excessively hot in the central plain during the months of September and October, and the winter is short and cold, though snow never falls except on the highest mountain peaks. Agriculture is in a very backward state, and locusts sometimes cause great damage. Wheat, barley, cotton, tobacco, olives, raisins and carobs are the most important vegetable products. The success of agriculture in most regions is dependent upon irrigation.

The wine made in Cyprus is famous, especially that known as *commandery*. Silkworms are reared, and a coarse kind of silk is woven. In ancient times the island was famous for its

minerals. Silver was produced in large quantities, and some precious stones were found; but copper was the most important of all. This metal takes its name from the name *Cyprus*. The copper mines are again being worked, though not on a large scale. Salt is produced in large quantities, and gypsum and terra umbra are found. Large numbers of sheep and goats are reared on the extensive pasture lands of the island. The principal towns are Lefkosia, or Nicosia, the capital, the only considerable inland town, and the seaports Larnaca and Limasol. Salamis, a famous port in ancient times, and Famagosta, important as a commercial point somewhat later, are now practically deserted, though the English have expended large sums in reconstructing the harbor at the latter point. There are several hundred miles of telegraph lines in the island, and good roads connect all the principal towns.

The early history of Cyprus is known only from excavations made recently, but certain facts have been well established. It belonged successively to Phoenicia, Egypt, Greece, Persia and again to Egypt, and it finally became a Roman province in 57 B. C. At the division of the Empire it passed to the eastern branch. Later it passed into the hands of the Arabs, the Greeks, the English, the Venetians and the Turks, who in 1570 invaded the country, took the capital, murdered 20,000 people and tortured the governor to death. It remained a Turkish possession until 1878, when by treaty it was placed in the control of England. It still occupies this position, though it is nominally a part of the Turkish Empire. Under British administration the island has become much more prosperous. Roads, harbors and other public works have been constructed, trees have been planted and schools opened. Population in 1911, 274,108.

Cyrenaic School of Philosophy, a system of philosophy established by Aristippus of Cyrene, a pupil and follower of Socrates. It taught that the highest good of life was pleasure, virtue consisting in the course of conduct that produced the greatest pleasure. Wisdom was lauded, because the pleasures resulting from untrained instincts and impulses often are inconsistent and in the end cease to be enjoyable. The doctrine was modified in various ways by Theodorus, Hegesias and others, until it merged in a sort of pessimism and finally in Epicureanism.

Cyrene, *si re'ne*, in ancient times a celebrated city in Africa, about 10 mi. from the north coast,

founded by Battus and a body of Dorian colonists in 631 B. C., and famous as a seat of Greek culture. Numerous interesting remains have been discovered here. The town now occupying the site of the ancient Cyrene is Grenna, in the Province of Barca.

Cyril, *sir'il*, SAINT (about 315-386), a Church father who became bishop of Jerusalem in 351. Through controversies with the Arians he was three times deposed, but each time he was restored. In 368 the emperor Valens banished him from his see, and he was not allowed to return until after the death of Valens in 378.

Cyril, SAINT (?-444), one of the fathers of the Greek Church, who became bishop of Alexandria in 412. An assault of the Jews upon the Christians of Alexandria led Cyril to expel all the Jews from the city, and this was well in accord with his usual severe and uncompromising character. His part in the Nestorian controversy was the most important event of his career, and he presided over the Council of Ephesus which deposed Nestorius. Among his numerous writings are commentaries, treatises and epistles.

Cyrus, *si'rus* (about 600-529 B. C.), king of Persia, a celebrated conqueror. According to Herodotus, he was the son of Cambyses, a famous Persian, and of Mandane, daughter of the Median king Astyages. Herodotus states that Astyages, troubled by a prophecy that his grandson was to dethrone him, gave orders that Cyrus should be destroyed immediately after his birth, but the boy was preserved by the kindness of a herdsman and at length was sent to his parents in Persia. He soon gathered a formidable army, conquered his grandfather and became master of Media and founded the Medo-Persian Empire. According to the records, he proved a wise and moderate king. After his conquest of Media and Persia he invaded Lydia, conquered the country and then turned against Babylon, which fell almost without a contest before the victorious arms of the hosts of Cyrus. The conqueror entered the city in triumph and made himself king. Here he showed his generosity toward conquered peoples by at least contributing to the release of the Jews from captivity. Cyrus was killed in an expedition against the Scythians, who dwelt north of his domains. The character and achievements of Cyrus the Great have been celebrated in the records of all peoples that came under his sway, as well as those whom he met as enemies.

Cyrus (?-401 B. C.), called *The Younger*, to distinguish him from Cyrus, the founder of the Medo-Persian monarchy, was the second son of Darius II. He formed a conspiracy against his elder brother, Artaxerxes Mnemon, and was condemned to death, but was released at the request of his mother and made governor of Asia Minor. Here he secretly gathered an army, of which ten thousand were Greek auxiliaries, and marched eastward. His brother with a large army met him in the plains of Cunaxa (401 B. C.), and in the battle which followed, Cyrus was slain. The account of the expedition and the retreat of the Greek soldiers is given by Xenophon in the *Anabasis*.

Czar or **Tsar**, *zahr*, a title of the emperor of Russia, a corruption of the Roman title *Caesar*, first adopted in 1547 by Ivan the Terrible. The empress of Russia bears the title czarina, while the heir apparent and his wife are known as the cesarevitch and cesarevna.

Czech, *chek*, the most westerly branch of the great Slavonic family of races. The Czechs are most numerous in Bohemia, where they arrived in the fifth century. The total number of Czechs is about 6,000,000, nearly all of whom

live in Austria-Hungary. The Bohemians proper number about 2,700,000. The Czech language is complex in its structure and is highly finished grammatically. The alphabet consists of forty-two letters, expressing a great variety of sounds. In musical value Czech ranks next to Italian.

Czernowitz, *cher'no vits*, the capital of the Austrian crownland of Bukowina, about 164 mi. e. of Lemberg. Among the prominent buildings are the archiepiscopal palace, the Greek-Oriental cathedral and a handsome Jewish synagogue. The educational institutions are a university, with a library of 60,000 volumes, a gymnasium and industrial and trade schools. There are manufactures of machinery and oil, saw mills and breweries. Population in 1910, 87,128.

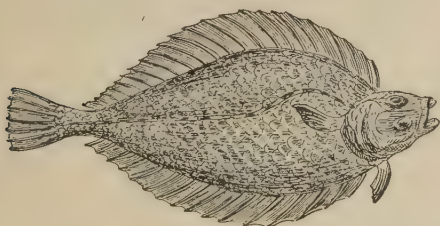
Czerny, *cher'ne*, KARL (1791-1857), an Austrian composer and piano virtuoso. He studied under his father, an accomplished musician, then under Beethoven, and at the age of fifteen he had already gained wide popularity as pianist and teacher. Among his pupils were Liszt and Thalberg. His exercises and books of instruction for the piano are widely used.



D, the fourth letter in the alphabet. In form our D is the same as the Latin D, which was developed from the Greek Δ. This, in turn, was derived from the Phoenician character, which was probably an outgrowth of an original hieroglyphic representation of a door. The Δ does, in fact, still retain a resemblance to a tent door. In corresponding words of related languages, *d* is often interchanged with *t*, which it resembles in its mode of pronunciation.

In music D is the second note in the natural, or C, scale. As an abbreviation D represents five hundred, and when a line is placed above it, D represents five thousand.

Dab, a fish belonging to the family of flat-fishes, which includes also the sole, turbot, halibut, plaice and flounder. The dab is of a pale brownish color, spotted with white on the side which it usually keeps uppermost, and plain white on the underside. It has rougher scales than the other members of the same genus. It is preferred to the flounder for the table. The dab is found on the shores of



DAB

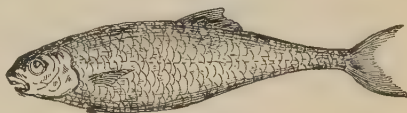
northern Europe and is common on the sandy coasts of Great Britain.

Dab'chick, a name which in the United States is commonly given to the pied-billed grebe. See GREBE.

Dac'ca or **Dhaka**, the capital of the province of Eastern Bengal and Assam, in India, on the Burhi Ganga, about 150 mi. n. e. of Calcutta. Before the nineteenth century this city was in a very prosperous condition and was important

as a commercial center, being famous for its muslins. It had many beautiful temples and palaces, and a population estimated at 200,000. After this it declined because of the change in the river system of that part of India, and the introduction of British manufactures almost ruined the textile industry, but after the building of a railway through Dacca, the trade revived and the textile manufactures became important again. The city now has several modern public buildings and educational institutions. The manufactures include textiles, fine silver and gold plate and filigree work, and there is also a large trade in elephants. Population in 1911, 108,551.

Dace, *dase*, **Dare** or **Dart**, a small river fish of the carp family, resembling the roach,



DACE

but longer and thinner. It is a gregarious fish, swimming in shoals and inhabiting deep, clear streams which have a gentle current. It is a common fish of western Europe, seldom exceeds a pound in weight and is not very good food. The chub of the United States is also sometimes called a dace.

Dacia, *da'she ah*, in ancient times, a region north of the Danube, the land of the Daci, afterward a Roman province. It was conquered by the emperor Trajan in 101 A. D., but in 274 A. D., in the reign of Aurelian, it had to be abandoned by the Roman colonists.

Daddy-long-legs, a little animal closely related to the spiders. It has a body usually oval or globose, and long, exceedingly slender legs, which are rather elevated in the middle, so that when the animal walks its body almost touches the ground. It has a characteristic disagreeable smell and feeds upon dead insects or small ones which are easily captured. Often

the daddy-long-legs is seen in great numbers in barns or other sheltered places.

Da'do, in architecture, the middle part of a pedestal, the solid rectangular part between the plinth and the cornice. In the interior of houses, the name is applied to a skirting of wood several feet high around the lower part of the walls, which is often also called wainscot, though this name is more properly given to a paneled dado.

Daedalus, *ded'a lus*, a mythical Greek architect and artisan. He built for the king of Crete the labyrinth in which the Minotaur was confined, but having seriously offended the king, he was himself imprisoned. To effect his escape and that of his son, he made two pairs of wings, which he fastened on their shoulders. The son, Icarus, in flying across the sea, rose so high that the heat of the sun melted the wax with which the wings were fastened together, and he fell into the sea and was drowned. Daedalus escaped unharmed.

Daf'odil, the popular name of the yellow narcissus, one of the earliest flowers of spring.

Daguerre, *da gair'*, LOUIS JACQUES MANDE (1789-1851), a French scientist, the inventor of the first photographic process. He was a scene-painter at Paris, and as early as 1814 his attention was directed to the subject of photographic pictures on metal. In 1833, Daguerre succeeded in perfecting the process since called *daguerreotype*. The new process excited the greatest interest. Daguerre was made an officer of the Legion of Honor, and an annuity of 6000 francs was settled on him. See DAGUERREOTYPE; PHOTOGRAPHY.

Daguerreotype, *da ger'o type*, the original photographic process, consisting in sensitizing a silver plate with the vapor of iodine and then placing it in a camera obscura, previously focused, and afterward developing the picture by vapor of mercury. It is then fixed by immersion in hyposulphate of sodium. After thorough washing and drying the picture is covered with glass to prevent its being rubbed off. The process is named from its inventor, Daguerre. It is now replaced by photography. See PHOTOGRAPHY.

Dahlgren, *dal'gren*, JOHN ADOLPH (1809-1870), an American naval officer and artillerist. He entered the navy in 1826 and afterward served in the coast survey. In 1850 he brought forward his invention of the gun which was named for him, which was of great value during the war. Subsequently he cruised in the West

Indies, and on his return to Washington he resumed command of the ordnance department, of which he was made chief in 1862. At the beginning of the Civil War he became commandant of the Washington navy yard, and in 1863 he was made rear admiral, and was placed in command of the South Atlantic blockading squadron. In 1866 he had command of the South Pacific squadron, and in 1868 he again took charge of the bureau of ordnance in Washington. In the following year he was appointed commandant of the Washington navy yard.

Dahl'ia (or *dale'ya*), a genus of plants belonging to the order Compositae, so called after the Swedish botanist Dahl. Dahlias are



DAHLIAS

natives of Mexico, but they are extensively cultivated in the United States and Europe, in an immense number of varieties, producing large and beautiful flowers of almost every imaginable color.

Daho'mey, a kingdom of West Africa on the coast of Guinea, now a French colony, having a total area of about 58,000 sq. mi. Dahomey, though generally level, has several mountain ranges and hilly regions. There are

Dairying

many springs, but no rivers of any great size. The country in general is fertile and well cultivated, the chief crops being india rubber, yams and the manioc root, which forms a principal article of food. Palm oil, shea butter and cotton are other products. Among the trees are the baobab and various kinds of fruit trees, including the tamarind, yellow fig, kola and cocoanut. The inhabitants are mostly Guinea negroes, who are pagans. They worship fetishes, and human sacrifices were formerly very common. The capital of the colony has been changed from Abomey to Porto Novo. Other towns are Kotonu, which is the chief port, Grand Popo, Agoue, Say and Allada. A railroad is being constructed inland from Kotonu. In 1892 the French obtained possession of Dahomey, took the stronghold of Abomey, deposed the king and established a French protectorate. Since that time the French have extended their authority over the land to the north. Population, estimated at 1,000,000.

Dai'rying or **Dairy Hus'bandry**, that branch of agriculture which is given to the production of milk and its various products. Dairying has always been given some attention on farms, and in Denmark and Holland it has been the leading agricultural occupation for a long time. Dairying as a distinct occupation in the United States has developed since 1860, the year in which the first cheese factory was built.

Dairying is carried on for three purposes—selling milk, making butter and making cheese. Milk is sold to supply the consumers in cities and for the purpose of making condensed milk. It was formerly supposed that dairying could be carried on with profit only within a limited section of the country and during the summer months; but the use of scientific methods has shown that, with proper care, good butter and cheese can be made in nearly all parts of North America, and that dairying can be made profitable during the entire year. The greatest care is necessary in the selection and feeding of the cows. By means of a milk tester, the dairyman is enabled to determine the quality of milk from each cow, and by weeding out the inferior animals and supplying their places with those of higher grade, he can bring his herd to the highest standard of excellence. In summer the cows are pastured and also fed rations of some green crop or of bran and meal. In winter they are fed hay, corn, silage and bran and meal.

D'Alembert

The by-products of milk are skim milk, butter-milk and whey. These are usually mixed with meal and fed to swine. Whey and skim milk are also used extensively in the manufacture of milk sugar.

The United States is the leading dairy country of the world. It contains about nineteen million cows, produces each year nearly one and one-fourth billion gallons of milk, makes one billion four hundred ninety-five million pounds of butter, two hundred ninety-nine million pounds of cheese and over one hundred eighty-five million pounds of condensed milk. The total value of the annual dairy products of the country is about five hundred ninety-one million dollars. See, also, AGRICULTURE, Vol. VI.

Dai'sy, the name of a familiar and favorite plant in Europe, which grows commonly in all the fields and meadows.

The typical daisy is pure white and single, with a yellow or brown center, but double daisies have been produced in great variety of colors. The daisy blooms almost continuously and has already become partially naturalized in the New England States. In the United States the oxeye daisy is a species



DAISY

of wild chrysanthemum, known commonly as the marguerite. In this country the name *daisy* is loosely applied to other flowers, such as the black-eyed Susan and some species of wild asters. During the age of chivalry the daisy was the emblem of fidelity and love, but in modern flower language it signifies simplicity.

Dale, SIR THOMAS (?-1619), a colonial governor of Virginia. He was knighted in 1606 for distinguished service in the British army and was sent to Virginia in 1611 with supplies and reinforcements for the colony. As deputy governor and later high marshal, he exercised a policy of coercion and military law which transformed the colony from a refuge for idlers and thieves into an industrious and prosperous community. His rules were known as *Dale's Code*, and his administration, from 1611 to 1616, as the "five years of slavery."

D'Alembert, *da lahN bair'*, (1717-1783), a French mathematician and philosopher, whose real name was Jean le Rond. He entered the

College Mazarin at the age of twelve and studied mathematics with success. Having left college, he studied law and became an advocate, but did not cease to occupy himself with mathematics. His most important works are a treatise on dynamics and one on fluids. The scholarship and excellence of these productions caused D'Alembert to be received into the Academy of Science and into the French Academy.

Dalhousie, *dal hoo'zy*, JAMES ANDREW BROWN RAMSAY (1812-1860), a British statesman, tenth earl and first marquis of Dalhousie. After filling the offices of vice-president and president of the board of trade, he was appointed governor general of India (1847). He greatly extended the British Empire in India, annexing the Punjab, Oude and other native states, and developing railways and canals.

Dallas, TEXAS, the county-seat of Dallas co., on the Trinity river, 315 miles north of Galveston. It is an important railroad center and is connected by electric lines with Fort Worth, 32 miles west, and Sherman, 64 miles north. It is an insurance and financial center and has large trade in grain, cotton, agricultural implements, farm and mill machinery, saddlery, paper, printers' supplies, etc. It manufactures cotton-gin machinery and presses, cotton oil products, harness, furniture, cement, candies and leather goods. It has a good system of public schools and academies, medical colleges and sanitariums. It also has an abundant supply of good water and modern city conveniences. It is the home of the State Fair of Texas. Population in 1910, 92,104.

Dallas, ALEXANDER JAMES (1759-1817), an American politician, born in Jamaica and educated at Edinburgh and Westminster. He removed in 1783 to Philadelphia, was admitted to the bar, became prominent in his profession and was appointed secretary of the treasury by President Madison in 1814. He recommended the reincorporation of the United States Bank in 1816.

Dallas, GEORGE MIFFLIN (1792-1864), an American statesman, born in Philadelphia. He graduated at Princeton in 1810 and went to Russia as private secretary to Albert Gallatin, special envoy. In 1828 he was elected mayor of Philadelphia. This office he resigned to become United States district attorney. In 1831 he was sent to the United States Senate and later was minister to Russia. He was elected vice-president with Polk in 1844 and was named

by Pierce minister to England, where he exhibited diplomatic ability of a high order.

Dalles, *dalz*, the name given to various rapids and cataracts in the United States. The dalles of the Columbia are about 200 miles from its mouth, where the river is compressed by lofty basaltic rocks into a roaring torrent. The rocks here present a scene of rare beauty. The dalles of the Saint Louis are a series of cataracts near Duluth, Minn., and the dalles of the Wisconsin are at Kilbourn in that state.

Dalles, THE, or **Dalles City**, ORE., the county-seat of Wasco co., 88 mi. e. of Portland, on the Columbia River and on the line of the Oregon Railroad & Navigation Co. This portion of the river valley is noted for the grandeur of its scenery. The principal industries are sheep and cattle raising, and grain and fruits are cultivated. The city contains flour and grist mills and wool-scouring plants and has a large trade in live stock and wool. The military post of Fort Dalles was established in 1838, and the settlement was incorporated in 1858. Population in 1910, 4880.

Dalmatia, *dal ma'she ah*, a province of Austria, the most southern portion of the Austrian dominions, occupying a narrow strip of land along the Adriatic Sea and covering an area of 4940 sq. mi. The inland parts of Dalmatia are diversified by hills and high mountains. There are some rich valleys, but the country is considered unproductive. The interior is occupied by a backward population, and agriculture is in a crude state. Apples, pears, peaches, apricots, oranges and pomegranates are among the fruits. On the coast, fish, especially the tunny and the sardine, abound. The trade of the country is mostly confined to the coast towns, and chief of these are Zara, the capital, Sebenico, Cattaro, Spalato and Ragusa. After passing successively through the hands of Hungarian and Venetian rulers and of the first Napoleon, Dalmatia in 1814 fell under Austrian rule. Population in 1910, 645,664.

Dalmatic or **Dalmatica**, an ecclesiastical vestment worn by the deacon at mass, so called because it was an imitation of Dalmatian costume. It is a long robe with large, full sleeves, black or red longitudinal stripes and partially unclosed sides. Bishops also wear the dalmatic under the chasuble.

Daly, JOHN AUGUSTIN (1838-1899), an American playwright. He acted for years as dramatic critic of New York newspapers and

in 1869 began his career as a theatrical manager. Some of the leading players of America were at one time or another in Daly's company, and Ada Rehan was a member of his company for years. He wrote adaptations from French and German authors and a few original plays.

Dalzell', JOHN (1845-), an American lawyer and politician, born in New York. He graduated at Yale in 1865, was admitted to the bar and gained a large practice, becoming attorney for the Pennsylvania Railroad Company and many other corporations. He was elected to Congress as a Republican in 1887 and continuously reelected for over twenty-five years, being a member of the important committees on rules and on ways and means and an acknowledged leader of his party.

Dam, a bank, or construction of stone, earth or wood across a stream for the purpose of keeping back the current to give it increased head, for holding back supplies of water, for flooding lands or for rendering the stream above the dam navigable by increased depth. Its material and construction will depend on its situation and the amount of pressure it has to bear. For streams which are broad and deep strong materials are required, usually stone masonry bound in hydraulic cement and a strong framework of timber. The common forms of a dam are either a straight line crossing the stream transversely, one or two straight lines traversing it diagonally, or an arc with its convex side toward the current. See IRRIGATION.

Dam'ages, in law, pecuniary compensation paid to a person for loss or injury sustained by him through the fault of another. It is not necessary that the act should have been a fraudulent one; it is enough that it be illegal, unwarrantable or malicious. It is becoming the common practice in both England and America to allow the damages to cover only the loss sustained, estimated at its real value, together with the expenses incurred in pressing the suit. Formerly it was the usual principle to award damages not only for actual loss, but for "retribution" or "satisfaction," as well. This is still the rule in many states in special causes.

Damaraland, *da mah'ra land*, a German protectorate in South Africa, extending from the Atlantic coast to the Kalahari desert and covering an area of 100,000 sq. mi. It forms the northern part of German Southwest Africa. It is mountainous and hilly, and copper is found in the mountains. Cattle raising is the chief industry.

Damas'cus, a celebrated city, capital of Syria, supposed by some to be the most ancient city in the world. It is beautifully situated on a plain which is covered with gardens and orchards and watered by the Barrada. The streets are narrow, crooked and in parts dilapidated, and, except in the wealthy Moslem quarter, the houses are low, with flat-arched doors. Within, however, there is often a singular contrast, the furniture and decorations being elegant and costly. The chief buildings are the Great Mosque and the Citadel. Among the places of historical and traditional interest are the leper hospital in the house of Naaman, the house of Ananias and the place of Saint Paul's conversion. The bazaars are a notable feature of Damascus. In the midst of the bazaars stands the Great Khan, it and thirty inferior khans being used as exchanges or market places by the merchants. Damascus is an important center of trade in European manufactures; it is also a place of considerable manufacturing importance, the principal products being silk, damasks, cotton and other fabrics, tobacco, glass, soap, fine cabinet work and elegant jewelry; but the manufacture of the famous sword blades no longer exists. Damascus is one of the holy Moslem cities and continues to be thoroughly Oriental in all its features. After passing successively under the power of Israelites, Persians, Greeks and Romans, it fell at last in 1516 into the hands of the Turks. Population, estimated at 200,000.

Damascus Steel, a kind of steel originally made in Damascus and the East, greatly valued in the making of swords for its hardness of edge and flexibility. It is made of pure iron and steel of peculiar quality. It contains a larger proportion of carbon than ordinary steel and is produced by careful heating, laborious forging, doubling and twisting. See STEEL.

Dam'ask, a costly fabric of silk, linen or wool, made by weaving the weft into the warp in such a way as to make figures such as fruit, flowers, leaves and other forms. It gets its name from Damascus, the city where it was first manufactured. Linen damasks are used chiefly for tablecloths and napkins. Damasks of silk and of wool make handsome furniture coverings.

Dam'askeen'ing, the ornamenting of iron and steel with designs produced by inlaying or incrusting with another metal, such as gold or silver. The pattern is etched on the steel, and the other metal is filled into the etched lines.

Damien, *da myahN'*, FATHER JOSEPH DE VEUSTER (1840-1889), a Roman Catholic missionary, born at Tremeloo, Belgium. He entered holy orders at the age of nineteen, and devoted his life to the cause of the Church. Having been sent on a mission to Honolulu, he learned of the terrible condition of the lepers banished to Molokai Island, and decided to devote his life to the amelioration of their condition. He went to live among them in 1873, becoming himself their physician, teacher, carpenter, magistrate and friend. In 1885 he contracted the fatal disease, but he continued his work until his death.

Damietta, *dah'me et'tah*, a town of Egypt, on one of the principal branches of the Nile, about 6 mi. from its mouth. It contains some fine mosques, bazaars and marble baths. Since the construction of the Su z Canal and the advancement of Alexandria, the commerce of Damietta has declined, but it has still a considerable trade with the interior, in fish and rice. Population in 1907, 29,354.

Damocles, *dam'o kleez*, a courtier of Dionysius, tyrant of Syracuse. Damocles declared one day that he considered the lot of Dionysius the happiest on earth, and Dionysius offered to give him a taste of the glory which he so much envied. While seated at a table surrounded by all the royal appointments, Damocles on looking up was horrified to perceive a sword suspended over his head by a single hair. Dionysius had thus made plain to him the uncertain nature of royal happiness.

Da'mon and Pyth'ias, two illustrious Syracusans, celebrated as models of constant friendship. Pythias had been unjustly condemned to death by Dionysius the younger, tyrant of Syracuse; and as he was obliged to leave Syracuse to arrange his affairs, his friend Damon was taken as a pledge that Pythias should return on the day fixed. Pythias, being unexpectedly detained, had great difficulty in reaching Syracuse in time to save Damon from being executed in his place, and Damon made no attempt to escape from his promise. Dionysius was so affected by the proof of their friendship that he pardoned Pythias. The Knights of Pythias, a fraternal order established in the United States, has this incident for its basis (See PYTHIAS, KNIGHTS OF).

Damrosch, *dahm'rosh*, LEOPOLD (1832-1885), a German-American musician, born at Posen, Prussia. He graduated in medicine at the University of Berlin and began practice at Posen,

but he soon abandoned his profession for the study of music and became a concert violinist in 1855. He later became director of orchestra in Posen and Breslau and in 1871 went to New York, where he was director of the Arion Society. He was the first to establish choral societies in New York. In 1884 he accomplished his most notable achievement in introducing and maintaining German opera in New York City. He was the author of numerous cantatas, concertos and songs, none of which displayed great genius, and was a frequent contributor to musical magazines.

Damrosch, WALTER JOHANNES (1862-), an American musician and orchestra conductor, born in Germany, the son of Leopold Damrosch, also a German-American musician of note. His first important position was conductor of the oratorio and symphony societies in New York and assistant conductor of the German opera at the Metropolitan Opera House. In 1900 he conducted German opera in New York and in the following year became conductor of the New York Philharmonic Orchestra, one of the leading organizations of its kind in the country. His compositions disclose no great originality.

Damson, *dam'z'n*, a variety of the common plum. The fruit is naturally rather small and oval, but its numerous forms, some of which are quite large, are of different colors, black, bluish, dark purple and yellow.

Dan (meaning judgment). 1. One of the sons of Jacob by Bilhah. At the time of the exodus the Danites numbered 62,700 adult males, being then the second tribe in point of numbers. Samson was a member of this tribe. 2. A town in the extreme north of Palestine. This, with Beersheba in the south, gives rise to the expression "from Dan to Beersheba," meaning the land from north to south, or the entire distance between two places.

Da'na, CHARLES ANDERSON (1819-1897), an American journalist, born at Hinsdale, N. H. He studied at Harvard, but was obliged to leave after two years, because of ill health. He was a member of the Brook Farm association and one of the editors of a paper established in its interest. After working for other papers he joined in 1847 the New York *Tribune*, on the staff of which he remained for fifteen years. During the last two years of the war he was assistant secretary of war, and after the close of the war he started a Chicago paper, which, however, was not successful. From 1888 he

Dana

was editor and part owner of the *New York Sun*, and perhaps more than any other journalist his personality was identified with his newspaper. He was a man of intense prejudices and was consequently at times far from popular.

Dana, JAMES DWIGHT (1813-1895), an American geologist, born in Utica, N. Y. In 1850 he became professor of natural history at Yale College. He wrote *System of Mineralogy*, *Manual of Mineralogy*, *Coral Reefs and Islands*, *Manual of Geology* and *Text Book of Geology*. Dana did much to place American geology on a scientific basis and also to popularize the subject. He was recognized as the foremost American geologist.

Dana, RICHARD HENRY (1787-1879), an American author, born at Cambridge, Mass., and educated at Harvard College. After studying law for some time he turned his attention to literature, wrote many articles for the *North American Review* and published several collections of poems, besides two novels. His talks on Shakespeare in the *North American Review* are perhaps his most noteworthy contribution to literature.

Dana, RICHARD HENRY, JR. (1815-1882), an American lawyer and author, son of Richard Henry Dana, the poet. After being obliged to give up his work at Harvard College, he took a sea voyage around Cape Horn to California and published, as a result of his experiences during the voyage, *Two Years Before the Mast*, which made him an immediate reputation. He became later a lawyer and held various important official positions.

Danaë, dan'a e. See PERSEUS.

Danbury, dan'ber ry, CONN., one of the county-seats of Fairfield co., 60 mi. n. e. of New York City, on several lines of the New York, New Haven & Hartford railroad. Hat making was begun here about 1780, and about \$3,600,000 of capital is now invested in this industry. There are also manufactures of machinery, boxes, shirts, silk and silver plate ware. The city has a public library, parks and a beautiful cemetery. The place was settled in 1684 and was chartered as a city in 1889. During the Revolution supplies for the American army were stored here, and in 1777 the town was entered by General Tryon, the British governor of New York, who destroyed the stores and a large number of buildings. Population in 1910, 20,234.

Dancing, dan'sing, a form of exercise or amusement in which one or more persons make

Dancing

a series of more or less graceful movements, with measured steps in accord with music. In its earliest forms among simple races, it is a mode of expressing strong emotions of joy and sorrow, love and rage, and even of the most solemn and impassioned religious feelings; in more civilized forms of human society it becomes a mere amusement, with no high signification whatever, or an agreeable spectacle at public entertainments. Dancing corresponds to a universal primitive instinct in man. It is still practiced by the South Sea Islanders, the forest indians of Brazil, the Zulus, the negroes of Central Africa and the native Australians, exactly as it was in the earlier stages of every civilized modern race. Ferocious war dances were practiced by savage warriors, as, for example, the North American indian braves, who worked themselves up into frantic mechanical intoxication, capable of carrying them irresistibly on to victory. The Zulu war dance is still a noble exercise for warriors, like the Pyrrhic dance of the ancient Spartans; and the dancing and whirling dervishes in the East, who work themselves into spasms of physical excitement, are still respected for devoutness and piety. Into savage dancing, the idea of magic always enters. Thus, the Mandan indians dance buffalo dances to bring game when supplies of food are low; the rain doctors of Central Africa dance mystic dances to bring down rain, and the wives of Gold Coast negroes dance a battle dance to give their absent husbands courage in the battle. Among the ancient historic peoples dancing was generally an expression of religious, patriotic or military feeling, as in the case of the dance of David before the ark, or the Pyrrhic dance of the Greeks. The Romans, however, like the Orientals, hired slaves to do the dancing. France took the lead in inventing modern dances. Among some of these dances were the graceful *minuet*, the favorite for a century; the *quadrille*; the *galop*, introduced from Germany; the *cotillion*, fashionable under Charles X; the *polka*, first danced at Odeon in 1840 by a dancing master from Prague; the *schottisch*, also of Bohemian origin, first brought out in Paris in 1844; the *lancers*, introduced by Laborde in 1836, and the *waltz*, originally Bavarian, which, now considerably modified from its original form, promises to maintain supremacy. Characteristic of particular races or merely of classes of people are such forms of the dance as the *Scotch reel*, *Highland fling* and *strath-*

spey; the Irish *jig*; the negro *break-downs*; sailors' *hornpipes*; *step-dances*, *morris-dances* and the like. The *two-step* is a modern dance of American origin. A renewed interest in social dancing has led to the introduction of various new steps, among which may be mentioned the *one-step* and the *tango*.

Dan'deli'on, a plant native to Europe, but now also common in America. The leaves are toothed, radiating from the crown of the root. In the spring, summer and fall, the plant blooms profusely, bearing many slender stalks, each surmounted by one large, bright yellow head of many small flowers, which mature into a beautiful white ball of feathered fruits. These are transported far and wide by the wind. The whole plant is full of a milky and bitter juice. Some species have powerful medicinal properties, and the young leaves of all are often used for greens and salads.



DANDELION

Dan'die Din'mont, a peculiar breed of the Scotch terrier, taking its name from the farmer of that name who figures in Scott's novel *Guy Mannering*. This breed is known by its short legs, wiry and abundant hair and large ears. Usually it is of either a light-brown or a bluish-gray color.

Daniel, the prophet, a contemporary of Ezekiel, was born of a distinguished Hebrew family. In his youth, 605 B. C., he was carried captive to Babylon and was educated in the court of King Nebuchadnezzar. Thrown into the lions' den for conscientiously refusing to obey the king, he was miraculously preserved and was finally made prime minister in the court of the Persian king Darius. (*Dan.* I, II, IV-VI.)

Daniell Battery, a galvanic battery, the cells of which were originally constructed as follows: A tall cylindrical copper vessel was nearly filled with a strong solution of sulphate of copper (blue vitriol). A rod of amalgamated zinc was enclosed in a skin or bladder, which was filled with dilute sulphuric acid and was suspended in a copper cylinder. When the zinc

rod was connected by wire with the copper vessel, the current passed from the copper through the wire to the zinc. The modern Daniell battery consists of a glass jar in which is placed a porous cup containing zinc. This cup is enclosed in a copper cylinder having an opening on one side for the free circulation of the liquid. Dilute sulphuric acid is placed in the cup containing the zinc, and a solution of sulphate of copper is placed in the jar. A small porous vessel filled with sulphate of copper is also placed in the jar, to maintain the strength of the solution. The sulphuric acid in the porous cup unites with the zinc, and the copper sulphate in the jar is decomposed and deposits its copper on the copper cylinder. These chemical changes produce a current of electricity which flows from the copper to the zinc. The Daniell battery in various forms is in general use in telegraph stations and for other purposes where a continuous working battery producing a low current is desired.

Dan'ish West In'dies. See WEST INDIES, DANISH.

Dan'te Alighieri (1265-1321), the greatest poet of Italy and one of the greatest poets of the world, was born in Florence of a family which probably belonged to the lower nobility. Of his youth and education nothing definite is known, although it may be that he studied with the learned Brunetto Latini. He was but a boy of nine years when he first saw Beatrice Portinari, and the love she awakened in him he has described in that record of his early years, the *New Life*, as well as in his later great work, the *Divina Commedia*. In 1291, the year after the death of Beatrice, Dante married Gemma Donati, by whom he had several children. Soon after this time the Guelphs in Florence became divided into the rival factions of Bianchi and Neri (Whites and Blacks), the latter an extreme papal party, the former a moderate party which wished for reconciliation with the Ghibellines. Dante's sympathies were with the Bianchi, and when, in 1302, the opposite party gained control, Dante was banished with many of his fellows. The poet remained an exile to the end of his life; and his history during this time is semi-mythical. He is said to have visited many cities, Arezzo, Bologna, Sienna and even Paris, and in 1320 he certainly stayed at Ravenna, with his friend Guido da Polenta. He was buried at Ravenna, where his bones still lie.

Dante's great poem, the *Divine Comedy*,

Dante

written in great part, if not altogether, during his exile, is divided into three parts, entitled *Hell*, *Purgatory* and *Paradise*. The title *Comedy* was given to it, in accordance with the standards of the time, because it begins with



DANTE ALIGHIERI

horrible scenes and ends cheerfully. The epithet *Divine* was added by others.

The poet dreams that he has wandered into a dusky forest, when the shade of Vergil appears and offers to conduct him through hell and purgatory. Further the pagan poet may not go, but Beatrice herself will lead him through paradise. Dante with marvelous imaginative power gives brief life histories of the famous guilty ones—pope and Ghibelline, Italian lord and lady—often in his severe style compressing the story into two or three lines, but always picturing guilt and punishment with passionate force, subtle insight and intense religious faith. From hell, the poet, still in the company of Vergil, ascends to purgatory, where the scenes are similar, though the punishments are only temporary. In the earthly paradise above purgatory, Dante beholds Beatrice in a scene of surpassing magnificence, ascends with her into the celestial paradise, and after roaming over seven spheres he reaches the eighth, where he beholds “the glorious company, which surrounds the triumphant Redeemer.” In the ninth Dante feels himself in the presence of the

Danville

Divine essence, and sees the souls of the blessed on thrones in a circle of infinite magnitude. The Deity himself, in the tenth, he cannot see for excess of light. Dante’s great poem, which has no rival in the work of any one man, has been feelingly translated by scholarly men into many languages.

Danton, *dahN tohN’*, GEORGES JACQUES (1759–1794), one of the leaders in the French Revolution. He was foremost in organizing and conducting the attack on the Tuileries, August 10, 1792, voted for the capital punishment of all returning aristocrats and for the death of the king, and with Robespierre brought Hébert and his followers to the scaffold. Robespierre succeeded in having Danton denounced and thrown into prison because he had dared to counsel moderation, and he was afterward condemned by the revolutionary tribunal as an accomplice in a conspiracy for the restoration of monarchy, and was executed.

Dant’zic. See DANZIG.

Dan’ube, a celebrated river of Europe, which originates in two small streams, rising in the Black Forest, in Baden, and uniting at Donaueschingen. The direct distance from source to mouth of the Danube is about 1000 miles, and its total length, including windings, about 1670 miles. From its source the Danube flows in a northeasterly direction to Ulm, in Württemberg, where it becomes navigable for vessels of 100 tons; then to Ratisbon, in Bavaria, where it becomes navigable for steamers. Here it turns in a southeasterly direction, entering Austria at Passau, passing Vienna and Budapest, above which it suddenly turns due south, holding this direction till it is joined by the Drave, after which it runs southeasterly and enters Servia at Belgrade. Continuing its general course eastward, it forms for a long distance the boundary line between Rumania and Bulgaria. At Silistria it once more turns northward, and flowing between Rumania and Bessarabia it falls into the Black Sea by three different outlets.

Dan’vers, MASS., a town in Essex co., 19 mi. n. e. of Boston, on the Boston & Maine railroad. It has manufactures of shoes, leather, brick and lumber and contains a public library, a large state hospital for the insane and the Saint John’s Normal College. Danvers was a part of Salem until 1756. Population in 1910, including several villages, 9407.

Dan’ville, ILL., the county-seat of Vermilion co., 123 mi. s. of Chicago, on the Ver-

Danville

million River and on the Wabash, the Chicago & Eastern Illinois, the Big Four and other railroads. Coal mining is the chief industry, and the city contains foundries, woolen mills, glass works and brick yards. It has a Carnegie Library, a Y. M. C. A. building, three national banks, three public parks and a national soldiers' home. The place was settled about 1830 and was incorporated in 1867. Population in 1910, 27,871.

Danville, PA., the county-seat of Montour co., 154 mi. n. w. of Philadelphia, on the north branch of the Susquehanna River, and on the Pennsylvania, the Delaware, Lackawanna & Western and the Philadelphia & Reading railroads. The borough is near deposits of anthracite coal, iron ore and limestone, and it contains blast furnaces, rolling mills, stove works and other factories. A state hospital for the insane is located here. Population in 1910, 7517.

Danville, VA., a city of Pittsylvania County, 140 mi. s. w. of Richmond, on the Dan River and on the Southern and the Danville & Western railroads. The city has a beautiful location, is in a region producing a very fine quality of tobacco, is the second largest leaf tobacco market in America and contains about forty tobacco factories. The river furnishes good water power, and there are large cotton works, flour and grist mills and other factories. It is the seat of the Roanoke Female College, Randolph Macon Institute for Young Ladies and the Danville Military Institute. The place was settled in 1792. It was for a short time the seat of the government of the Southern Confederacy in 1865. Population in 1910, 19,020.

Danzig or Dantzic, *dahn'tsiK*, a fortified town and port in Prussia, capital of the province of West Prussia, 285 mi. n. e. of Berlin, on the Vistula, about 3 mi. above its mouth. It is one of the most important seaports in the Prussian monarchy. Among the principal buildings are the Dom or Cathedral, begun in 1343; the Church of Saint Catharine; the fine old Rathaus; the exchange; the arsenal; an observatory; three monasteries; two synagogues, and two theaters. The prosperity of the town is founded chiefly on its transit trade. The principal trade is in grain, timber and sugar. There are government establishments for the manufacture of arms and ammunition. The proper port of Danzig is Neufahrwasser, at the mouth of the Vistula. Danzig is mentioned in historical

Darfur

accounts as early as the tenth century. After being alternately possessed by the Teutonic knights and the Poles, Danzig, on the partition of Poland, fell to the lot of Prussia. Population in 1910, 170,347.

Daphnia, *daf'ne ah*, the water flea, a genus of minute crustaceans, of which the best-known species is the "branch-horned" water flea, a favorite microscopic object. The head is prolonged into a snout and is provided with a single, central, compound eye; it is also furnished with antennae which act as oars, propelling it through the water by a series of short springs or jerks. These animals are very abundant in many ponds and ditches; and as they assume a red color in summer they sometimes make the water look like blood.

Dardanelles, *dahr da nelz'*, (ancient Hellespont), a narrow channel, which connects the Sea of Marmora with the Aegean Sea, and at this particular point separates Europe from Asia. It is about forty miles in length and varies in breadth from one to four miles. A rapid current, often much increased by winds, runs southward. On the Asiatic side the country presents beautiful scenery, rising gradually upward from the sea to the range of Mount Ida; the European side is steep and rugged, but is densely peopled and highly cultivated. On both shores there are numerous forts and batteries. Two castles on the opposite shores occupy the sites of ancient Sestos and Abydos and recall the story of Hero and Leander. By a treaty made in 1841 between the five great powers and Turkey, confirmed by the Peace of Paris in 1856, it is settled that no foreign man-of-war shall pass the strait without the express permission of the Turkish government.

Dare, VIRGINIA (1587-?), the first English child born in the new world. She was born at Roanoke, Va., and was a granddaughter of Governor John White.

Darfur or Darfoor, *dahr'foor*, a country of Central Africa, forming a large oasis in the southeast corner of the Great Desert. The inhabitants are Mohammedans and negroes and are semi-barbarous. Their occupation is chiefly agricultural, and cattle form their principal wealth. The country produces millet, rice, maize, sesame, oranges, tobacco and cotton. Most of the trade is carried on with Egypt and Mecca. Since 1899 Darfur has been under English-Egyptian rule, with its capital at El Fasher. Population, estimated at from 1,500,000 to 4,000,000.

Darien

Darien', GULF OF, a gulf of the Caribbean Sea, at the north extremity of South America, between the Isthmus of Panama and the mainland. The chief river flowing into it is the Atrato.

Darien, ISTHMUS OF. See PANAMA, ISTHMUS OF.

Darien Scheme, a celebrated financial project set afloat by a Scotchman, William Patterson, whose purpose was to form a settlement on each side of the Isthmus of Darien, in order to control the trade between the eastern and western hemispheres. Nearly \$4,000,000 was subscribed, fully half of it in Scotland, and in 1698 twelve hundred Scotch colonists sailed for the isthmus. Disease and famine, however, caused them to desert their settlement and return to Scotland in June, 1699. Two other companies of about the same size also attempted to establish settlements at Darien, with equally unfortunate results. The whole affair was one of the most disastrous financial enterprises in history.

Darius I (550-485 B. C.), a Persian king who attained the throne in 521 B. C. One of his first acts was to divide his empire into twenty satrapies, with a governor over each. He reduced, after a two years' siege, the revolted city of Babylon, and led an expedition of seven hundred thousand men against the Scythians on the Danube. The Greeks had aided the Ionians in their struggle to free themselves from Persia, and Darius therefore sent an army under Mardonius to invade Greece. But the ships of Mardonius were destroyed by a storm in doubling Mount Athos, and his army was cut to pieces by the Thracians. Darius, however, fitted out a second expedition, which was met on the plains of Marathon by an Athenian army under Miltiades and completely defeated (490 B. C.). Darius had determined on a third expedition, when he died in 485.

Darius III, the twelfth and last king of Persia. He ascended the throne in 336 B. C., when the kingdom had been weakened by luxury and the tyranny of the satraps and could not resist the attacks of Alexander of Macedon; and the army of Darius was totally routed on the banks of the Granicus, in Asia Minor. Darius then hastened to meet Alexander in the mountainous region of Cilicia and was a second time totally defeated near the Issus. Two years afterward, all proposals for peace having been rejected by Alexander, Darius collected another army, met the Macedonian forces between

Darling River

Arbela and Gaugamela, and was again routed. Alexander captured Susa, the capital, and Persepolis, and reduced all Persia. Meanwhile, Darius was collecting another army at Ecbatana in Media, when a traitorous conspiracy was formed against him, by which he lost his life, in 330 B. C.

Dark Ages, a term used to designate the period extending from about the fall of the Roman Empire, in 476, to the revival of learning, in the twelfth century. Sometimes the words are understood to mean the entire Middle Ages. See MIDDLE AGES.

Darley, FELIX OCTAVIUS CARR (1822-1888), an American artist, born in Philadelphia. While a clerk in a mercantile house in Philadelphia he produced some humorous sketches which were so highly praised that he devoted himself to the pursuit of art by making drawings for engravers. In 1848 he went to New York City. His illustrations for books were almost innumerable. The works of Cooper, Longfellow, Hawthorne, Shakespeare and Dickens were illustrated by Darley.

Darling, GRACE HORSLEY (1815-1842), a celebrated English heroine. In 1838 the steamer *Forfarshire*, with forty-one passengers on board, besides her crew, became disabled off the Farne Islands during a storm and was thrown on a rock, where she broke in two, part of the crew and passengers being left clinging to the wreck. Next morning William Darling descried them from Longstone Lighthouse, about a mile distant, but he shrank from attempting to reach the wreck through a boiling sea in a boat. His daughter Grace, however, implored him to make the attempt and let her accompany him. At last he consented, and, father and daughter each taking an oar, they reached the wreck and succeeded in rescuing nine sufferers. The news of the heroic deed soon spread, and the brave girl received testimonials from all quarters. A purse of \$3,500 was publicly subscribed and presented to her. Four years afterward she died of consumption.

Darling Range, a range of mountains extending in a northerly direction in western Australia. They are parallel with the coast, and the range has a length of about three hundred miles. They are low mountains, the highest peak not exceeding 1500 feet.

Darling River, a river which rises in the northeast part of New South Wales, Australia, flows in a southwesterly and southerly direction and joins the Murray.

Darmstadt

Darmstadt, *dahrm'staht*, a town in Germany, capital of the grand duchy of Hesse, situated 15 mi. s. of Frankfort. Among the remarkable buildings are the old grand-ducal palace, containing one of the largest libraries in Germany, the Catholic church, and the Rathaus, or townhall, built in 1580. Darmstadt is a busy manufacturing town. There are iron foundries, breweries, machine shops and various factories. The town is also an important railway center. In 1330 it secured municipal rights, and in 1567 it became the capital of Hesse. It was burned by the French in the seventeenth century, but afterwards rapidly rose in importance. Population in 1910, 87,085.

Dar'nel, the popular name of a species of poisonous grass. It appears to be the tares of Scripture. Its properties are said to be narcotic and stupefying, but recent researches have cast some doubt on its reported injurious qualities. It is met with in cornfields and is now naturalized in North America.

Darning Needle. See DRAGON FLY.

Darn'ley, HENRY STUART, Lord (1545-1567), son of the earl of Lennox and Lady Margaret Douglas, a niece of Henry VIII. In 1565 he was married to Mary Queen of Scots. It was an unfortunate match; Mary was disgusted at his coarseness and could not long conceal her contempt. His part in the murder of Rizzio angered Mary still further, and when, on February 9, 1567, the house in which he lay recovering from an illness was blown up by gunpowder, Mary was suspected of complicity in the crime. Although the earl of Bothwell was certainly concerned in the crime, he escaped punishment. See BOTHWELL, JAMES HERBURN, Earl of; MARY STUART.

Dar'rah, MRS. LYDIA, a famous American heroine. She was a Quaker and resided in Philadelphia. When the British army was there the adjutant general hired one of her rooms for private conferences. On Dec. 2, 1777, some particular and emphatic directions were given that excited her curiosity. She listened at the door of the meeting room and heard an order read that the British soldiery should march out of camp on December 4 to attack the Americans then quartered eight miles distant. On the following morning she walked several miles on the snowy ground and approached the American camp. Here she met Colonel Craig and gave him the information. When the British arrived, they found the army of Washington prepared to meet

Dartmouth College

them at all points, and the enterprise miscarried.

Dart'er or **Snake Bird**, a web-footed bird related to the cormorant and found near the eastern coasts of the tropical parts of America and the western coast of tropical Africa, as well



DARTER

as in Australia. It is the habit of these birds to perch on trees by the water side and, after hovering an instant over the water, suddenly to dart at their prey with unerring aim. Their necks are long and snake-like, the head being scarcely thicker than the neck, and from this fact they get the second name given above.

Dartmouth, *dahrt'muth*, **College**, an educational institution of collegiate grade, situated at Hanover, N. H. The college is the outgrowth of an indian school which was opened in 1754 and was founded by Rev. Eleazar Wheelock. The institution was named from the earl of Dartmouth, who was one of the principal contributors and the first president of the board of trustees. The college began its existence in the midst of the wilderness, and the only buildings for several years were log huts, but it continued to increase in numbers and influence until it became one of the leading colleges of the country. Later, a religious controversy caused the state legislature to create a new corporation, which, without consent of the old board of trustees, assumed control of the college. This led to what is known as the Dartmouth College Case (See DARTMOUTH COLLEGE CASE). The college still remains an institution for men only. It maintains the following departments: classical, medical, the Chandler School of Science, the Thayer School of Civil Engineering and the Tuck School of Commerce and Finance. There are about two hundred in the faculty, and the average

enrollment is 1200. The library contains 100,000 volumes, and the value of the property, including endowments, is \$3,200,000.

Dartmouth College Case, the name given to a famous case arising from a suit instituted by the trustees of Dartmouth College for the purpose of recovering control of the college and property, which had been taken from them by act of the New Hampshire legislature in 1816. Dartmouth College was founded by a charter granted by George III in 1769. When the independence of the United States was established, the State of New Hampshire assumed the position occupied by the throne under the colonial government. Some years later the legislature created a new corporation for the college, making certain changes in its management. The college appealed to the courts, but lost its suit, and then appealed to the United States Supreme Court, where its case was argued by Daniel Webster. The Supreme Court, in a decision handed down by Chief Justice Marshall, declared that the legislature did not have authority to legislate the old charter out of existence, or to pass laws violating its provisions, by reason of the clause in the United States Constitution which establishes the inviolability of contracts.

Darwin, CHARLES ROBERT (1809-1882), a noted English naturalist. He early devoted himself to the study of natural history, and in 1831 he was appointed naturalist to the surveying voyage of H. M. S. *Beagle*, commanded by Captain Fitzroy. Darwin came home with rich stores of knowledge, part of which he soon gave to the public in various works. In 1859 his name attained its great celebrity by the publication of *The Origin of Species by Means of Natural Selection*. This work, scouted and derided though it was at first in certain quarters, may be said to have worked nothing less than a revolution in biological science. In it for the first time was given a full exposition of the theory of evolution as applied to plants and animals, the origin of species being explained on the hypothesis of natural selection. This theory is now generally accepted by the prominent scientists, though modified and improved in many of its details. The rest of his works are largely based on the material he had accumulated for the elaboration of this great theory. The principal ones are a treatise on the *Fertilization of Orchids*; *Domesticated Animals and Cultivated Plants*; *Descent of Man and Variation in Relation to Sex*; *The*

Expression of the Emotions in Man and Animals; *Movements and Habits of Climbing Plants*; *Insectivorous Plants*; *Cross and Self*



CHARLES DARWIN

Fertilization; *The Power of Movement in Plants*, and *The Formation of Vegetable Mold*. See EVOLUTION.

Das'kam, JOSEPHINE DODGE. See BACON, JOSEPHINE DASKAM.

Dasyure, *das'e ure*, a genus of animals, allied to the opossums, that carry their young in pouches. The ursine dasyure of Tasmania is about the size of a badger, but of a sturdier form and of a dull black color. It feeds on flesh and has a savage temper. Formerly it was most destructive to flocks and poultry yards, but is now seldom found in the inhabited districts.

Date, the fruit of the date palm, or the tree itself. The fruit is used extensively as an article of food by the natives of northern Africa and of some countries of Asia. It consists of a fleshy coat, separable into three portions, and covering a hard, horny seed. Next to the cocoanut palm, the date is unquestionably the most interesting and useful of the palm tribe. Its stem shoots up to the height of fifty or sixty feet, without branch or division, and is of nearly the same thickness throughout its length. From the summit it throws out a magnificent crown of large, feather-shaped leaves, besides a number

Date Plum

of stalks, each of which in the female plant bears a bunch of from 180 to 200 dates, each bunch weighing from twenty to twenty-five pounds. The fruit is eaten fresh or dried.



DATE PALM

Cakes of dates pounded and kneaded together are the food of the Arabs who traverse the deserts. A liquor resembling wine is made from dates by fermentation.

Date Plum, the name given to several different trees of the ebony family. The European date plum is a low-growing tree, native of the south of Europe, that produces a small edible fruit. The Chinese date plum is cultivated for the sake of its fruit, which is about the size of a small apple and is made into a preserve. See PERSIMMON.

D'Aubigne, *do be nyay'*, JEAN HENRI MERLE. See MERLE D'AUBIGNE, JEAN HENRI.

Daudet, *do da'*, ALPHONSE (1840-1897), a French novelist, born at Nîmes. He went to Paris in 1857 to seek his fortune, but his collections of poems failed to win any attention, and his plays met with little better reception.

Davenport

When he discovered his powers as a story-teller, however, his success was assured. The volumes of short stories, *Letters from My Mill* and *Monday Tales*, established his reputation, which was rendered more secure by each novel which he published. *Numa Roumestan* and *The Nabob* are probably his greatest works, although many readers find *Tartarin of Tarascon* the most attractive. Daudet himself regarded *Sapho* as the best of his writings.

Daughters of the American Revolution, a patriotic society, organized in Washington, D. C., in 1890. Only those women whose ancestors fought upon the American side in the Revolutionary War are admitted to membership. Its purpose is the fostering of reverence for the achievements of the Revolutionary heroes and the collection of relics and the erection of monuments. There are chapters in almost all the states and territories and in Canada, Hawaii and Europe. Its membership of eighty thousand is divided among seven hundred local chapters. The society owns a beautiful memorial hall in Washington, completed early in 1910.

Dauphin, *daw'fn*, the title of the eldest son of the king of France, prior to the revolution of 1830. The name was assumed toward the middle of the ninth century by the lord of Dauphiny, which province was bequeathed by Humbert II to the king of France in 1349, on condition that the heir of the throne should bear the title of Dauphin of Vienne and should govern the province.

Dav'enport, IOWA, the county-seat of Scott co., situated on the Mississippi River, 330 mi. above Saint Louis, 183 mi. w. by s. of Chicago, and opposite Rock Island, Ill. It is on the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & Saint Paul, the Chicago, Burlington & Quincy and a number of other railroads. The city is built upon the sides of a bluff and has a beautiful location overlooking a wide extent of country. It is connected with Rock Island by a railroad bridge and a combined wagon and railroad bridge. The important buildings include the Saint Luke's and Mercy hospitals, two opera houses, a public library, a commercial club building and a number of excellent business blocks. Among the educational institutions are the Academy of the Immaculate Conception, Saint Ambrose College and Saint Katherine's Hall. The leading church edifices are the Protestant Episcopal and Roman Catholic cathedrals, Saint John's Methodist Church and

Davenport

the Kirkwood Presbyterian Church. The Iowa Soldiers' Orphans' Home is also located here. The city has a large trade in farm produce and is the seat of a number of extensive industries, including meat packing, manufactories of flour, lumber, wagons, carriages, farming implements and machinery, locomotives, pumps, steel cars and soap. The city has eleven banks. Davenport was founded in 1835 and was named for Colonel George Davenport, the leader of the company forming the first settlement. It was incorporated as a town in 1838 and as a city in 1851. Population in 1910, 43,028.

Davenport, FANNY LILY GIPSY (1850-1898), an American actress, born in London, but educated in Boston. She was only seven years old when she first appeared on the stage and was but twelve when she made her formal debut in *Faint Heart Never Won Fair Lady*. After playing for a short time in Mrs. Drew's theater in Philadelphia, she became connected with Augustin Daly's company in New York. Among her most famous productions are *Fedora*, *Cleopatra* and *La Tosca*.

Da'vid, king of Israel, the youngest son of Jesse, a citizen of Bethlehem, and descended through Boaz from the ancient princes of Judah (*I* and *II Sam.*; *I Chron.*). He reigned from 1055 B. C. to 1015 B. C., according to the usual chronology, but recent investigations put the dates from thirty to fifty years later. Under David the empire of the Israelites rose to the height of its power, and his reign has always been looked on by the Jews as the golden age of their nation's history.

David, JACQUES LOUIS (1748-1825), founder of the modern French school of painting. He went to Rome in 1774, and passed several years there painting important pictures. A second visit produced the *Horatii*, one of his greatest works. He was appointed first painter to Napoleon about 1804; and after the second restoration of Louis XVIII he was included in the decree which banished all regicides from France, when he retired to Brussels. Most of his paintings are executed according to the strict rules of art, without any attempt at expression, naturalness or sentiment. The best examples of his work are *Coronation of Napoleon I*, *The Death of Socrates*, *Belisarius Asking Alms* and *Three Fates*.

David, PIERRE JEAN (1789-1856), a French sculptor, born at Angers, called David of Angers, to distinguish him from the painter David. He studied sculpture first at Paris and later at

Davis

Rome, where he became associated with Canova and Thorwaldsen. In 1831 he began the magnificent sculptures of the Pantheon, his most important work, which he finished in 1837. He executed a great number of medallions, busts and statues of celebrated persons of all countries. Among his best statues are those of *Madame de Staël*, *Talma*, *Corneille* and *Lafayette*.

Davies, da'viz, LOUIS HENRY, Sir (1845-), a Canadian statesman, born at Charlottetown, Prince Edward's Island, educated at Prince of Wales College in Charlottetown and admitted to the bar in 1866. Ten years later he became premier and attorney general of the province of Prince Edward's Island. From 1882 to 1901 he was a Liberal member of the House of Commons; he resigned to become a justice of the Dominion supreme court.

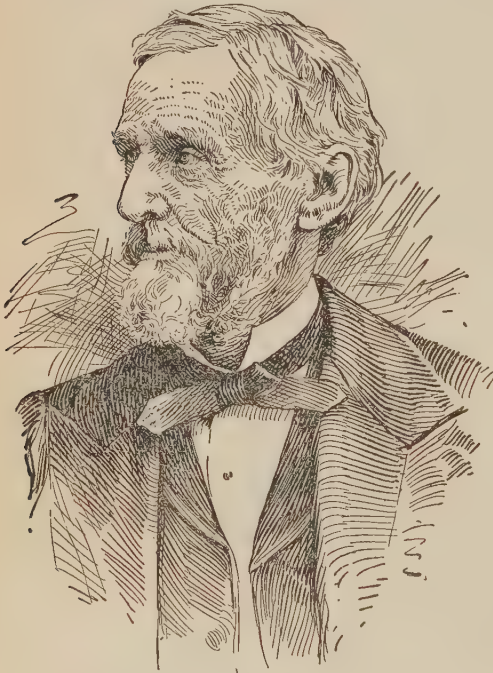
Da'vis, CUSHMAN KELLOGG (1838-1901), an American statesman, born at Henderson, N. Y., and educated at the University of Michigan. He was admitted to the bar in 1860, but on the breaking out of the Civil War he enlisted as a private. He left the army at the end of two years with the rank of captain. In 1864 he began to practice law in Saint Paul, was elected governor of Minnesota in 1873 and United States senator in 1887, which position he held during the remainder of his life. He was for many years chairman of the committee on foreign relations and was a member of the peace commission which concluded the treaty with Spain.

Davis, DAVID (1815-1886), an American jurist, born in Cecil County, Md. He graduated from Kenyon College, Ohio, studied law in Massachusetts and Connecticut, and removed to Illinois in 1835. In 1844 he was a member of the state legislature, and in 1848 was made United States circuit judge. In October, 1862, President Lincoln appointed him associate justice of the Supreme Court. Judge Davis was nominated by the labor reformers for president in 1872, but he usually affiliated with the Democratic party. In March, 1877, he resigned to enter the United States Senate.

Davis, HENRY WINTER (1817-1865), an American statesman, born in Annapolis, Md., and educated at Kenyon College and the University of Virginia. He began the practice of law at Baltimore. He was in Congress from 1855 to 1861 and again from 1863 to 1865. Although representing a slave state, he was a strenuous advocate of emancipation and negro suffrage.

Davis

Davis, JEFFERSON (1808–1889), an American statesman, president of the Confederate States of America. He was born in Kentucky, but at an early age he went with his parents to Mississippi, where he received his early education. He entered West Point Military Academy, graduating in 1828, and for seven years he saw important service on the frontier. In 1835 he became a cotton planter and he was elected to Congress in 1845, where he was an ardent follower of Calhoun. At the commencement of the Mexican War he left Congress and entered the contest as colonel of a regiment, performing distinguished service. He entered the



JEFFERSON DAVIS

Senate in 1847 and became the leader of the Southern party in the slavery and states' rights controversy. Davis was secretary of war during Pierce's administration and while holding this position introduced several marked improvements in military tactics, coast defense, armament and transportation. Upon the secession of Mississippi, he retired from the Senate, delivering a notable farewell address, and in the same year was elected president of the Confederate States. During the war he acted with good judgment, dignity and devotion to principle and was especially anxious to mitigate the suffering and sorrow caused by the war.

Davis Strait

He was taken prisoner soon after the fall of Richmond and was confined in Fortress Monroe for two years, but was liberated by the general amnesty of 1868. During his last years Mr. Davis resided in Memphis and Mississippi, dying in New Orleans. In 1831 he published *The Rise and Fall of the Confederate Government*, giving his view of the controversy. His remains were removed from New Orleans and interred at Richmond in 1893.

Davis, NATHAN SMITH (1817–1904), an American physician, editor and professor in Northwestern University Medical School, of which he was a founder. Several other important societies and institutions owe their origin to him. Among his publications are *A History of Medical Education and Institutions in the United States*, *Clinical Lectures*, *Effects of Alcoholic Drink* and *A History of the American Medical Association*.

Davis, REBECCA HARDING (1831–1910), an American novelist, born in Washington, Pa. She first became known for the gloomy power of a story, *Life in the Iron Mills*, published (1861) in the *Atlantic Monthly*. She married L. Clarke Davis, editor of the *Philadelphia Inquirer*, and much of her brilliant talent went into journalistic work which will not be preserved. She introduced the labor question into American fiction. Among her novels are *Dallas Galbraith* and *A Law unto Herself*.

Davis, RICHARD HARDING (1864–), an American novelist and journalist, the son of Rebecca Harding Davis, born at Philadelphia. He was educated at Lehigh and Johns Hopkins universities, and began literary work as a newspaper reporter in Philadelphia. After serving for a time on the staff of the *New York Evening Sun*, he became managing editor of *Harper's Weekly*. This position he held but a short time. *Gallegher and Other Stories*, published in 1891, first gained him wide attention, and from that time he held his audience by the interest of his narratives and the vigor of his style. Among his other books are *Van Bibber and Others*, *Cuba in War Time*, *The Cuban and Porto Rican Campaign*, *With Both Armies in South Africa*, and the novels *The Princess Aline*, *The King's Jackal*, *Soldiers of Fortune* and *Ransom's Folly*.

Davis Strait, a narrow sea which separates Greenland from Baffin Land, and unites Baffin Bay with the Atlantic Ocean. It is from 180 to 500 miles wide and was discovered in 1585 by John Davis, after whom it was named.

Da'vitt, MICHAEL (1846-1906), an Irish political leader. In 1870 he was sentenced to fifteen years' imprisonment for bringing arms into Ireland, but he was released in 1878. The next year he founded the Irish Land League, which soon spread over the entire country. He made a tour of the United States on behalf of that organization in 1880; and on his return to England he was again arrested on his old sentence and was held in prison for fifteen months. While in prison he was repeatedly elected to Parliament, but was disqualified. He was later elected twice without opposition, but resigned in 1899.

Da'vy, HUMPHRY, Sir (1778-1829), a distinguished English chemist and natural philosopher. He was appointed professor of chemistry in the Royal Institution at the age of twenty-four. In 1803 he was chosen a member of the Royal Society. His discoveries with the galvanic battery, his decomposition of the earths and alkalies and the ascertaining of their metallic bases obtained him an extensive reputation. From his investigation of firedamp in mines, he was led to the invention of a safety lamp, which has rendered the mines comparatively free from explosions and thus prevented the death of thousands of workmen.

Dawes, dawz, HENRY LAURENS (1816-1903), an American statesman, born in Cummington, Mass. He graduated at Yale College and studied law. After serving as a member of the House of Representatives for seven consecutive terms, in 1874 he was elected United States senator from Massachusetts, being reelected in 1881 and 1887. He was a special student of indian affairs, was at the time of his death commissioner of the Five Civilized Tribes and performed important service in protecting them against fraud and dishonesty.

Daw'son, a port in Canada, the capital of the Yukon district in the Northwest Territories, on the right bank of the Yukon River, 330 mi. n. n. w. of Skagway, and on the line of the Pacific & Arctic Railway & Navigation Company. There are several churches, schools, hotels and theaters. Dawson is the center of the Klondike gold mining region. Its origin dates from the discovery of gold on Bonanza Creek in 1896. Coal deposits have been found in the neighboring region, but the city has gradually declined since the early boom days. Population in 1911, 4000.

Dawson, GEORGE MERCER (1849-1901), a Canadian geologist and explorer, born in Truro,

N. S., educated at McGill University and the Royal School of Mines, London, Eng. He became a member of the staff of the Geological Survey in 1875, and was its director in 1895. He explored a large portion of the western country and made the mineral resources of the region known to the Canadian government. He was a member of the Bering Sea Commission of 1891.

Dawson, JOHN WILLIAM, Sir (1820-1899), a Canadian geologist and educator. He received his education at Edinburgh University and at an early age turned his attention to geology. In 1842 he accompanied Sir Charles Lyell on an expedition to examine the geology of Nova Scotia. In 1850 Dawson became superintendent of education for Nova Scotia, and five years later he was made principal and professor of geology in McGill University, Montreal, and later vice-chancellor. He was elected president of the American Association for the Advancement of Science in 1882 and four years later became president of the British Association for the Advancement of Science. Among his many contributions to the literature on science are *Acadian Geology*; *The Story of the Earth and Man*; *The Origin of the World*; *Egypt and Syria*; *Modern Ideas of Evolution*, and *The Change of Life in Geological Time*.

Day, either the interval of time during which the sun is continuously above the horizon, or the time occupied by the revolution of the earth on its axis, embracing the period of darkness as well as the interval of daylight. The day in the latter sense may be measured in more than one way. If we measure it by the apparent movement of the stars, caused by the rotation of the earth on its axis, we must call day the period between the time when a star is on the meridian and when it again returns to the meridian; this is a *sidereal* day. It is uniformly equal to 23 hours, 56 minutes, 4.098 seconds. But more important than this is the *solar* day, or the interval between two passages of the sun across the meridian of any place. The latter is about four minutes longer than the sidereal day, owing to the revolution of the earth round the sun, and it is not of uniform length, owing to the varying speed at which the earth moves in its orbit and to the obliquity of the ecliptic. For convenience, an average length of the solar day is taken, and this gives us the *mean solar* or *civil* day of twenty-four hours, the difference between which and the actual solar day at any time is the *equation of*

time. The length of the days and nights at any place varies with the latitude and season of the year, owing to the inclination of the earth's axis. In the first place, the days and nights are equal all over the world on the 21st of March and the 21st of September, which dates are called the *vernal* (spring) and *autumnal equinoxes*. Again, the days and nights are always of equal length at the equator, which, for this reason, is sometimes called the *equinoctial* line. With these exceptions, we find the difference between the duration of the day and the night varying more and more as we recede from the equator.

The Babylonians began the day at sunrise; the Jews at sunset; the Egyptians and Romans at midnight, as do most modern peoples. The civil day in most countries is divided into two portions of twelve hours each. The abbreviations P. M. (post meridiem), afternoon, and A. M. (ante meridiem), forenoon, indicate these divisions. The Italians in some places reckon the day from sunset to sunset and enumerate the hours up to twenty-four; the Chinese divide it into twelve parts of two hours each. For astronomical purposes the day is divided into twenty-four hours, instead of two parts of twelve hours. Formerly the English day began at noon, but since Jan. 1, 1885, the day of twenty-four hours begins at midnight at Greenwich observatory; and this reckoning is now generally adopted for astronomical purposes throughout the world. At midday at Greenwich the date (day of the week and month) is everywhere the same, though there are all possible differences in naming the hour of the day. But midday at Greenwich is the only instant at which we ever have the same date all over the world. The meridian of midnight, which is then at 180° east or west, goes on revolving, gradually bringing a new date to every place to the west of that line, but obviously not bringing that new date to the places immediately to the east of that line till twenty-four hours after. From this it follows that whereas places on the same side of the globe never have a different date except when midnight lies between them, places on opposite sides of the globe and on different sides of the meridian of 180° never have the same date except when midnight lies between them.

Day, WILLIAM RUFUS (1849-), an American jurist and statesman, born at Ravenna, Ohio. He graduated at the University of Michigan in 1870 and was admitted to the bar

two years later. He practiced law at Canton, Ohio, until 1886 and was appointed to several important positions on the bench. Judge Day became first assistant secretary of state in April, 1897, and was made secretary of state upon the resignation of John Sherman in April, 1898. This position he resigned to act as chairman of the Spanish-American Peace Commission. He was appointed United States circuit judge by President McKinley in 1899 and was made associate justice of the Supreme Court in 1903 by President Roosevelt.

Day Lily, the popular name for a genus of lilies, natives of temperate Asia and eastern Europe, two species of which are grown in gardens. They have long leaves, growing from the ground, and a branched, few-flowered stem, with large, fragrant, white blossoms, the segments of which are united into a tube.

Dayton, OHIO, the county-seat of Montgomery co., on the Great Miami River, 60 mi. n. e. of Cincinnati, on the Cleveland, Cincinnati, Chicago & Saint Louis, the Erie, the Pennsylvania and other railroads. The city has a beautiful location in the fertile Miami valley. From the main business portion, the land rises to heights of from 100 to 400 feet, and on these elevations are some of the fine residence sections. Van Cleave Park, along the river, where the first settlers landed, contains the first house built in Dayton, which now serves as an historical museum. There is a fine soldiers' monument on Main Street near the river bridge. Spanning the rivers are twelve bridges, three of which are beautiful, wide, arched structures of concrete. On an elevation adjoining the city at the west is the central branch of the National Soldiers' Home, which occupies beautiful grounds of about 600 acres. The public library stands in Library Park, near the center of the city.

The educational institutions of Dayton include the United Brethren Theological Seminary, Saint Mary's Institute, the Academy of Notre Dame, good public schools, including kindergartens, manual training school and the Steele High School. The Miami Valley and Saint Elizabeth's hospitals, a state asylum for the insane, a county orphan asylum and a widows' home are other institutions. There are many fine churches, and some of the prominent buildings are the old and new courthouses, the Y. M. C. A. building, the Union Passenger station, the United Brethren, Conover, Arcade and other business blocks and several hotels.

Dayton

There are many large industrial establishments producing cash registers, railway cars, oil-mill machinery, steam pumps, sewing machines, bicycles, automobiles, engines, flour, sash and blinds and various other articles. In 1796, the first settlement was made on land which was purchased the previous year from the indians by Colonel Ludlow and Generals Saint Clair Wilkinson and Jonathan Dayton, after whom the place was named. It was incorporated in 1805, and was chartered as a city in 1841. In March, 1913, the city suffered disastrously from a great overflow of the Miami. Several hundred lives were lost and millions of dollars worth of property were destroyed. For several days Dayton was entirely cut off from the rest of the world because tracks were washed out and wires were down. Many other towns of the Ohio Valley also suffered. In the same year Dayton adopted the commission form of government, which was followed in January, 1914, by the appointment of a city manager. See MUNICIPAL GOVERNMENT.

Dayton, WILLIAM LEWIS (1807-1864), an American statesman, born in Somerset co., N. J. He graduated at Princeton in 1825, studied law and began practice in Trenton, N. J., in 1830. He was appointed to the United States Senate in 1842 to fill a vacancy, and was reelected in 1845, being an active opponent of slavery. In 1856 he was nominated for vice-president on the Republican ticket with John C. Fremont. From 1861 until his death he was minister to France.

Deaconess, *de'kon ess*, a religious order among women in various branches of the Christian church. The first references to the order are found in *Romans* XVI, 1 and *I Timothy* v, 9 and following verses. The order seems to have been established during the days of the Apostles, and the functions of the members were to assist the deacons and other officials of the church, especially in the care of women. In the fifth century the order was abolished and was not revived until the early part of the nineteenth century. The first of the modern orders was established in Prussia in 1836, by the United Evangelical Church. The first order in the United States was established in Saint Andrew's Parish of the Protestant Episcopal Church, Baltimore, in 1855, and in 1888 the general conference of the Methodist Episcopal Church provided for the establishment of an order of deaconesses. The members of the modern orders are required to prepare themselves by

Dead Sea

special training in school devoted to this purpose and are usually inducted into office by the authorities of the church. Various branches of the Christian church now maintain these orders throughout the United States and most of the countries of Europe. Their work is similar to that of the early deaconesses, though somewhat more extended, as the requirements of the church are broader. In the Catholic and some of the Episcopal churches, the work of deaconesses in other churches is performed by sisterhoods.

Dead-letter Office, a division of the post office department to which is sent all mail matter that cannot be delivered. This matter includes all letters and packages that have remained in the office to which they were sent for one month without being called for, and which do not contain any address for their return to the sender; letters, papers and packages that are imperfectly addressed, and articles excluded from the mails by the regulations of the postal authorities, such as liquids, live animals and explosives. Each year thousands of packages, opened and unopened, are disposed of at public auction. See POSTOFFICE.

Dead Reck'oning, the calculation of a ship's place at sea, without any observation of the heavenly bodies. It is obtained by keeping an account of the distance the ship has run by the log and of her course steered by the compass, and by rectifying these data by the usual allowance for drift, leeway and winds. Dead reckoning can never be accurate; so whenever possible it is corrected by astronomical observations.

Dead Sea, called in Scripture Salt Sea, Sea of the Plains and East Sea, a celebrated lake in Asiatic Turkey, near the south extremity of Palestine. Its length is about 46 miles, and its breadth at the widest part, 9 or 10 miles. The basin in which the Dead Sea reposes forms the south end of the great depression through which the Jordan flows, that river entering the lake at its north extremity. It receives several other tributaries, but has no outlet. The surface is 1312 feet below the level of the Mediterranean. It lies deeply imbedded between lofty cliffs of naked limestone, its shores presenting a scene of indescribable desolation and solitude, encompassed by desert sands and bleak, stony, salt hills. Sulphur and rock salt, lava and pumice abound along its shores. The water is nauseous to the taste and smell, and it is so buoyant that the human body will not sink in it. The Dead Sea contains no life of any kind. At about a

Deadwood

third of its length from the north end it attains a maximum depth of 1308 feet.

Dead'wood, S. D., the county-seat of Lawrence co., is situated in the canyon of White-wood Creek, on the Chicago, Burlington & Quincy and the Chicago & Northwestern railroads and on an electric line to Lead, three miles southwest. The city is in the center of a rich gold belt, and cyanide works, smelters and other mining industries are located here. It is also the seat of a United States assay office. Among the important buildings are the Masonic Temple and Franklin Hotel. The place was settled in 1876. Population in 1910, 3653.

Deaf, def, and Dumb (or **Deaf-mutes**), persons both deaf and dumb, the dumbness resulting from deafness, which has either existed from birth or from a very early period of life. Such persons are unable to speak, simply because they have not the guidance of the sense of hearing to enable them to imitate sounds. Among the causes assigned for congenital deafness are the intermarriage of near relatives, hereditary transmission, scrofula, certain local or climatic conditions and arrest of development before birth. Acquired or accidental deafness, which occurs at all ages, is frequently due to such diseases as smallpox, measles, typhus, paralysis and other affections of the brain, but more particularly to scarlet fever, which is somewhat apt to leave the patient deaf, owing to the inflamed state of the throat extending to the internal ear, and thus causing the formation of pus and the destruction of the extremely delicate parts of the auditory apparatus. In the greater proportion of deaf-mutes no defect is visible, none can be detected by anatomical examination and no applications yet discovered appear to be useful. The necessity of communication and the want of words oblige the deaf-mute to observe and imitate the actions and expressions which accompany various states of mind and of feeling, to indicate objects by their appearance and use, and persons by some peculiar mark, and to describe their actions by direct imitation. In this way he and his friends are led to form a dialect of that universal language of attitude, gesture and expression which becomes a substitute for words in the hands of the pantomimic actor, and which adds force and clearness to the finest effusions of the orator; in other words, the natural sign language, which, in its elements, is to be found among all nations. Such a means of communication is at its best very imperfect, however,

Deaf and Dumb

and various more perfect systems have been devised to enable deaf-mutes to communicate with one another and with the rest of mankind, and thus to gain such an education as people in general possess. See **DEAF AND DUMB, EDUCATION OF.**

Deaf and Dumb, EDUCATION OF. In ancient times and during most of the Middle Ages, the deaf were considered incapable of caring for themselves and could not enter upon a contract. In 1648 John Bulwer published a work in English advocating the education of deaf-mutes. About one hundred years later the first public demonstration of the practicability of such education was made. At about the same time a successful system of instruction was introduced into the Royal Parisian Institute, where it was followed for a long time. The vocal system of instruction was introduced into Germany in 1779, and the first public institute in England was established in 1792.



DEAF AND DUMB ALPHABET
For one hand

From this originated the London Asylum on Kent Road. The first school for the instruction of deaf in the United States was established at Hartford, Conn., in 1817. For a time this school received inmates from the New England states and from South Carolina and Georgia. Massachusetts then established an institute, and other states followed, until now every state has an institution for the education of deaf-

mates, and California, Illinois, Indiana, Massachusetts, Michigan, Missouri, Ohio and Wisconsin have provisions for establishing classes in connection with the public schools.

There are two methods of instruction which are generally followed. These are known as the *sign* method and the *oral* method. According to the first, the pupils are taught by the manual alphabet and by signs. According to the oral method the pupils are taught to observe the lips and other vocal organs of the teacher and then to reproduce the sounds. In the teaching of deaf children to speak, the pupils not only are expected to observe the motions of the organs, but are required to place their hands upon the throat of the teacher and feel the vibrations, then to place their hands upon their own throats and reproduce these vibrations. Most deaf children are expert observers with the eye and hand, and because of this they can be taught to speak intelligently, though the tones of the voice are usually more or less unnatural. However, often the work is so successfully done that persons carry on conversation with them without discovering their infirmity. In con-



DEAF AND DUMB ALPHABET
For two hands

nection with both systems the pupils are taught to read and write ordinary print and script. In all state institutions industrial training is also carried on along with the literary education.

Opinion is divided on the advantages to be derived from each of these methods of instruction. Those who favor the sign method claim that it is much more easily learned, and that the pupils therefore can make more rapid

progress; while the opponents of this system claim that the use of the sign language is not calculated to develop the intellect, and that pupils trained by this method never receive as broad an education or become as efficient thinkers as those trained by the oral method. Undoubtedly the great disadvantage of the oral method is the length of time required in mastering it, but when it is once mastered it is much more useful to the individual than the sign method. In 1848 Professor A. Melville Bell introduced what is known as the system of visible speech for instructing the deaf, and this system has now been quite generally adopted in the schools of this country and England. See VISIBLE SPEECH; SIGN LANGUAGE.

Dear'born, HENRY (1751-1829), an American soldier who distinguished himself in many battles of the Revolution and in the War of 1812. He was captured by the British at Quebec, but was released the next year and was with Washington at Yorktown. In 1793 he was elected to Congress and served two terms, and for eight years he was secretary of war. His last important public service was as minister to Portugal.

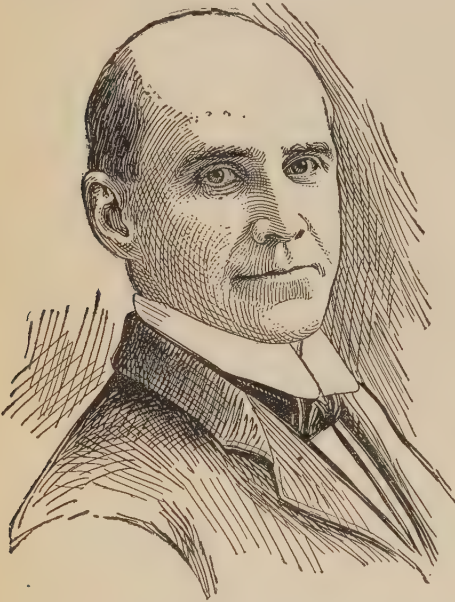
Death's-head Moth, a large moth, which has upon the back of its thorax marks closely resembling a skull, or death's-head. Its wings measure four or five inches across. Although the subject of many superstitious beliefs, it is probable that it does no other damage than occasionally attacking bees and consuming their honey.

Deathwatch, a beetle that lives in the woodwork of houses. Its call is a peculiar ticking sound, which superstitious people have interpreted as a forerunner of death.

Debreczen, *deb'bret sen*, a town of Hungary, on the edge of the great central plain, 137 mi. e. of Budapest. Among the principal edifices are the Protestant Church, the Rathaus, a theater and a college. The chief manufactures are coarse woolens, sausages, soap, tobacco pipes and casks, and a large trade in cattle is carried on. Population in 1910, 92,729.

Debs, EUGENE VICTOR (1855-), an American labor leader and lecturer, born at Terre Haute, Ind. He received a common school education, became locomotive fireman on the Terre Haute & Indianapolis railroad, and finally was a clerk in a wholesale grocery house. In 1879 he was elected city clerk of Terre Haute and six years later became a member of the Indiana legislature. From 1880 to 1893 he

was grand secretary and treasurer of the Brotherhood of Locomotive Firemen, and in the latter year he was made president of the newly organized American Railway Union. In that capacity he had charge of the immense western railway strike that centered at Chicago in 1894. During



EUGENE V. DEBS

its progress he was charged with conspiracy, but was acquitted; however, he was imprisoned for six months for contempt of court in violating an injunction. He was the candidate of the Socialist party for president of the United States in 1900, 1904, 1908 and again in 1912.

Debt, *det*, in the most general sense, that which is due from one person to another, but more strictly, in law, a sum of money due by reason of a particular and explicit agreement. The law regarding the debtor has had an interesting development. In most ancient times, and even in England under Saxon rule, the debtor became the practical, if not the actual, slave of his creditor. Under the feudal system, since military service played such an important part, the confinement of the debtor was impracticable, and there was a gradual change toward leniency in his treatment; but with the passing of feudalism the reactionary tendency toward severity set in, which only within a century has been ended by the abolishing of imprisonment for debt. An action to recover a debt is now begun by civil suit, which may result in a judgment payable in money, or, in lieu of

voluntary payment, by forcible seizure of enough of the debtor's property to pay the debt and the costs of the suit. Courts, however, still possess the right to punish severely and even to imprison debtors, where fraud or concealment or deception is evident. See **BANKRUPTCY**; **GARNISHMENT**; **EMBEZZLEMENT**; **CONTRACT**.

Debt, **NATIONAL**. See **NATIONAL DEBT**.

Decalogue, *dek'a log*, (*deka*, ten, and *logos*, a word), the ten commandments, which, according to *Exodus* xx and *Deuteronomy* v, were given by God to Moses on two tables. The Jews called them the *ten words*. Jews and Christians have divided the ten commandments differently; and in some Catholic catechisms the second commandment has been united with the first, and the tenth has been divided into two.

Decamps, *de kahN'*, ALEXANDRE-GABRIEL (1803-1860), a French painter, born in Paris. He received very little instruction, but worked industriously until he gained success. He chose for his subjects studies in landscape and common life. He was especially strong in the handling of color and in producing brilliant effects of atmosphere and light. As a landscape painter he was influenced by the English Constable and was highly reputed because of his interpretation of nature. Among his works are *The Monkey Experts*, *Cafe in Asia*, *Street of a Roman Village* and *Children Playing near a Fountain*.

De Candolle, *de kahN dohl'*, AUGUSTIN PYRAME (1778-1841), one of the most celebrated of botanists, born in Geneva, Switzerland. His youth was spent in industrious study of plant life, and at the age of eighteen he was writing books which gained him recognition among prominent scientists. Four years later he was made a professor in the College of France, and a few years afterwards he removed to Geneva, where a chair of natural history was founded for him and where he continued his scientific work for many years. His greatest published work was an important treatise on the vegetable kingdom, of which only seven volumes were completed before his death, the remaining fourteen being finished by his son.

Decap'olis, the name applied to a league of a number of cities of Palestine, which, like the Hanse towns, had certain privileges which are not clearly understood. Although the name literally means *ten cities*, the number in the league varied at different times. At the rising

of the Maccabees these cities were subdued by them, but when in 63 B. C. Pompey conquered the East, he annexed them to Syria. As they were surrounded by Jews, they needed some protection, and it is probable that the league was formed at this time.

Decatur, ILL., the county-seat of Macon co., 38 mi. e. of Springfield, on the Sangamon River and on the Illinois Central, the Wabash, the Vandalia and other railroads. The city is in a fertile, agricultural section, has good railroad facilities and ships large quantities of grain, live stock and coal. There are large grain elevators, flour mills, railroad shops and manufactures of iron, agricultural implements, furniture, carriages and other articles. The place was settled in 1830 and was incorporated six years later. Population in 1910, 31,140.

Decatur, STEPHEN (1779-1820), an American naval officer, born in Sinnepuxent, Md. In 1798



STEPHEN DECATUR

he entered the navy, and in 1803 he was given command of the *Enterprise*. The recapture and destruction of the United States frigate *Philadelphia*, which had been taken by the Tripolitans, was a daring act which won him promotion to the rank of captain. In 1812, while commander of the frigate *United States*, he encountered the British frigate *Macedonian* and captured her. On his way to sea through Long Island Sound, in 1813, Decatur's vessel was blockaded by the British fleet, and he was driven into New London where he was kept

for a year by a blockade. In 1815 he was sent with a squadron of nine vessels to the Mediterranean, captured two Algerine vessels and compelled the dey of Algiers to negotiate a treaty. He then entered Tunis and Tripoli, forced the release of the American prisoners and obtained satisfaction for past offenses. Returning to the United States, he was made a naval commissioner. His death was caused by a wound received in a duel with Commodore Barron.

Dec'an, a term locally limited to the territory of Hindustan, lying between the Nerbudda and the Kistna, but generally understood to include the whole country south of the Vindhya Mountains, thus comprising the presidency of Madras and part of Bombay, Hyderabad, Mysore, Travancore and other native states.

December, *de sem'bur*, the twelfth month of our year, from the Latin *decem*, ten, because in the Roman year, instituted by Romulus, it constituted the tenth month, the year beginning with March. In December the sun enters the tropic of Capricorn and passes the winter solstice.

Decemvirs, *de sem'virs*, (Latin, *decem*, ten, and *vir*, man), a board of ten men; specifically, the body of ten magistrates who had absolute authority in ancient Rome, 451-449 B. C. Those who officiated during the first of these years drew up an excellent code of laws and ruled wisely, but those who followed them were tyrannical and were driven from power by a revolution.

Deck, any one of the floors of a ship. The decks are named according to the position in the ship and also according to their uses. *Quarterdeck* means that part of the main deck which is back of the mainmast and on which the officers are usually to be found. In former times this was a short deck that communicated with the fore part of the ship only by a narrow passageway along the side of the ship; hence it was named the quarterdeck. The *forecastle deck* lies in the ship's bow, near the quarters of the men. The *main deck* in the United States navy is the highest deck, which extends the full length of the ship, and above it is the *upper deck*. The officers who navigate the ship occupy a raised platform, from which they can see the whole ship. This is known as the *bridge deck* or the *bridge*. In ships differently constructed and used for different purposes, there are numerous decks that receive special names.

Declaration of Independence

Dec'lara'tion of In'depen'dence, the solemn declaration of the Continental Congress in America, in session at Philadelphia, by which the thirteen colonies formally renounced allegiance to the government of Great Britain. It was the outgrowth of a gradual change of sentiment among the colonists, away from the old affection for England and its traditions toward a pride in local achievements and the love of the principles of self-government. The formal declaration was preceded by resolutions in the assemblies of almost all of the colonies, declaring that independence was inevitable and necessary. Finally, on May 15, 1776, John Adams offered a resolution recommending that each state form its own independent government, and on June 17 another formal resolution was introduced by Richard Henry Lee, declaring "that these united colonies are, and of right ought to be, free and independent states." After a long and somewhat bitter debate, in which the representatives of New York and Pennsylvania opposed the resolution, causing a delay of some weeks, it was passed on July 1, New York alone still withholding its approval. A committee was appointed on the following day, consisting of Thomas Jefferson of Virginia, John Adams of Massachusetts, Benjamin Franklin of Pennsylvania, Roger Sherman of Connecticut and Robert R. Livingston of New York, to consider the form of the declaration. As it was presented, it was the work chiefly of Thomas Jefferson and was adopted with few changes, on July 4, by twelve colonies, New York adding her approval on July 9. The document was endorsed and signed on August 2, 1776. The news caused the wildest rejoicing in all parts of the country and did much to produce unity of sentiment throughout the colonies. The original document is now in the care of the state department, and is sealed in a steel case for preservation among the relics of history.

Dec'li'na'tion, in astronomy, the distance of a heavenly body from the celestial equator, measured on a great circle passing through the pole and also through the body. It is said to be north or south according as the body is north or south of the equator. Great circles passing through the poles and cutting the equator at right angles are called *circles of declination*. Twenty-four circles of declination, dividing the equator into twenty-four arcs of 15° each, are called *hour circles* or *horary circles*. Declination, then, corresponds to latitude on the earth and is one of the two elements in determining the

Decoration Day

location of heavenly bodies. In other words, if the right ascension and the declination of a star are known, astronomers can locate it at once (See ASCENSION, RIGHT). Declination of the magnetic needle in the compass, or *magnetic declination*, is the variation of the magnetic needle from the true meridian of a place. This may be either east or west and is different at different places and at the same place at different times.

Decomposition, *de kom'po zish'un*, is the breaking up of a compound into more simple parts. These parts may be either compounds or elements. In most cases decomposition separates one body into two or more bodies, but what is called double decomposition is a change or breaking up of two or more compounds into the same number of other compounds. Decomposition may be caused by such forces as heat, light, electricity and chemical reagents; or it may be due, as in the case of vegetable and animal matter, to very small animals or plants, called bacteria and ferments.

Dec'ora'ted Style, in architecture, that form of English Gothic architecture in use in Great Britain from the end of the thirteenth to the beginning of the fifteenth century, when it passed into the Perpendicular. It is distinguished from the Early English, from which it was developed, by the more flowing or wavy lines of its tracery, especially of its windows; by the more graceful combinations of its foliage; by the greater richness of the decorations of the capitals of its columns, and generally by a style of ornamentation more profuse and naturalistic, though somewhat florid. The most distinctive ornament of the style is the ball flower, which is usually inserted in a hollow molding. The decorated style has been divided into two periods, the *Early*, or *Geometrical Decorated*, period, in which geometrical figures are largely introduced in the ornamentation; and the *Decorated style* proper, in which the peculiar characteristics of the style are exhibited. To this latter period belong some of the finest monuments of British architecture.

Dec'ora'tion Day or **Memorial Day**, the day set apart in the United States for the decoration of the graves of soldiers who fought in the Civil War. The custom originated before the close of the war in the South, where, in the spring of each year, women went together to the graves of the soldiers and decorated them with wild flowers. At about the same time a similar custom arose in the North, and on May 5,

1868, General John A. Logan, then commander in chief of the Grand Army of the Republic, fixed May 30 of that year as the day upon which the graves of the dead soldiers should be strewn with flowers. Since that time, though there has been no Federal legislation, most of the states have appointed May 30 of each year as a legal holiday for this purpose. It is generally known in the South as Memorial Day.

Decoy', a place into which wild fowls are decoyed in order to be caught. A decoy pond is kept only in a secluded situation. Several channels or pipes of a curved form, covered with light, hooped network, lead from the pond in various directions. The wild fowl are enticed to enter the wide mouth of the channel by tamed ducks, also called decoys, trained for the purpose, or by grain scattered on the water. When they have got well into the covered channel they are surprised by the decoyman and his dog and are driven up into the funnel net, where they are easily caught. The details differ in different cases, but this is the general principle of the contrivance. In the United States *decoy* is the name of an artificial bird, made to attract living birds of the same kind within the range of a hunter. Decoy ducks are most in use. These are made of wood or other material and are placed on the water, where they float 'about' in a lifelike manner near the concealed sportsman. Ducks flying over see the decoys and join them. In some states this manner of hunting is prohibited by law.

Dedham, *ded'am*, MASS., the county-seat of Norfolk co.; 10 mi. s. w. of the state house in Boston, on the Charles River and on the New York, New Haven & Hartford railroad. The town is a residence suburb of Boston and contains manufactures of cotton and woolen goods, carpets and pottery. The place was settled in 1635 and was called Contentment, but was incorporated the next year under its present name. The first public school in America supported by a general tax was established here in 1644. Population in 1910, including several villages, 9284.

Deduc'tion. See DEDUCTIVE METHOD.

Deduc'tive Method, in pedagogics, the method of teaching which begins with general truths or *a priori* principles (See A PRIORI AND A POSTERIORI), such as definitions and rules, and proceeds to apply them to particular facts. It is also called the synthetic method, because

it creates individual ideas under general laws. It is the reverse of the inductive method and is adapted to much of the work in grammar grades and predominates in teaching in high schools, colleges and universities. Geometry affords an excellent illustration of a branch which is taught by the deductive method. The theorems are the general truths with which the pupil starts, and he proceeds to prove these by the demonstration of particular propositions. The teaching of cube root by having pupils learn the rule and then apply it to the solution of problems is another good illustration, while the teaching of cube root by having pupils discover the rule by cubing a binomial, as $x + y$, and then applying, is an illustration of combining the inductive and deductive methods. See INDUCTIVE METHOD; METHODS OF TEACHING.

Dee, a river in England and Wales, rising in Lake Bala, Merionethshire. It flows north and northwest to the Irish Sea, 20 miles below Chester. It is about 80 miles long, and its tributaries are the Treveryn and the Alwyn. The Dee has connection with the rivers of central England by canals.

Dee, the name of two rivers in Scotland. The larger rises in the neighborhood of Ben Macdhui, and after a course of 12 miles it is joined by the Geauley, runs through Aberdeenshire and a part of Kincardineshire and empties into the North Sea. It is 90 miles long. The smaller Dee rises near the northern boundary of Kirkcudbrightshire. It flows in a southeasterly direction during the first part of its course, and then westerly, falling into the Solway Firth. It is 50 miles long and is noted for its excellent fisheries.

Deed, in law, a writing containing some contract or agreement, and the evidence of its execution; particularly, an instrument on paper or parchment, conveying real estate to a purchaser or donee. In the latter sense deeds are of two kinds, *warranty* and *quitclaim*. The former is one in which the party granting title to the property agrees to defend it against all claimants. The latter transfers whatever title the grantor has to the grantee. A deed should contain reference to some *consideration*, or compensation, and its granting clause should convey "to the party of the second part, *his heirs and assigns*." It should be signed by the grantor and his wife, if he is a married man, or by his authorized agent, and should be witnessed by at least two persons, then given to the grantee

Deer

who will have it recorded by the proper officer, the county register of deeds.

Deer, a general name for certain hoofed animals constituting a family in which there are more than fifty species. The distinguishing characteristic of the genus is that the members have solid, branching horns, which they shed every year. These antlers are outgrowths from the bone and are first covered by flesh and a velvety skin, which, when the horns are fully developed, dries up and is rubbed away, leaving the bones bare. The forms of the horns are various; sometimes they spread into broad palms, which send out sharp snags around their outer edges; sometimes they divide fantastically into branches, some of which project over the forehead, while others are reared upward in the air; or they may be so inclined backward that the animal seems almost forced to carry its head in a stiff, erect posture. After the breeding season the antlers fall off, leaving only a little prominence on the head, from which the new antlers develop with great rapidity. The male deer is called a *buck*, the female, a *doe*, and the young, a *fawn*.

There are many species of deer, as the *red deer* or *stag*, the *fallow deer*, the *roe* or *roe* *buck*, the *reindeer*, the *moose*, the *elk*, the *axis* and the *wapiti*. Deer are fairly widely distributed over the world, though there are none in Australia and few in Africa, where the antelopes take their place. Hunting the deer is great sport in the United States and Europe, and the flesh, or *venison*, as it is called, is much desired for the table. The skin is valuable for making a leather, called *buckskin*, and the antlers and hoofs are used in the manufacture of various kinds of ornamental goods. See CARIBOU; ELK; MOOSE; REINDEER; WAPITI; Color Plate with article GAME.

Defiance, OHIO, the county-seat of Defiance co., 51 mi., s. w. of Toledo, on the Maumee River, at the mouth of the Auglaize, on the Miami and Erie Canal and on the Wabash and the Baltimore & Ohio railroads. Defiance College is located here, and the city has a public library. It has a number of manufactories and conducts a large trade in agricultural produce and live stock. Population in 1910, 7327.

Defoe, DANIEL (1661-1731), one of the first English novelists, born in London. He was educated for the ministry, but began early to give his attention to literature. His first publications were political satires, notable among them *The True-born Englishman*, a

Deglutition

pamphlet in favor of William III, and *The Shortest Way with Dissenters*. *The Apparition of Mrs. Veal*, published in 1706, showed much of the genius for making fiction seem like fact which so strongly marks Defoe's later work. In 1719 appeared *Robinson Crusoe*, reckoned usually as the first English novel, in the modern sense of the term. This was followed by *The Memoirs of a Cavalier*, *Captain Singleton*, *Moll*



DANIEL DEFOE

Flanders, *Journal of the Plague Year* and *Roxana*, which, while they never attained the popularity of his first work, nevertheless possessed many of the qualities which made that remarkable. Defoe's genius consists largely in his ability to put himself in the place of his characters and to give without wearisomeness just the details which make a story seem real.

Deglutition, *deg'lu tish'un*, or the act of swallowing, is a muscular act, beginning in the mouth. The tongue is raised against the front part of the hard palate, the uvula takes a horizontal position to close the opening into the nostrils, the epiglottis is pressed down upon the glottis, or opening into the larynx, and when the food reaches the back of the throat it is seized by the involuntary muscles, carried quickly through the pharynx, slowly through the esophagus to the cardiac orifice, which opens to allow the food to enter the stomach.

Degree

A juggler can drink while standing on his head, because swallowing is a muscular act.

Degree', a term denoting extent or intensity. In geometry or trigonometry it is the ninetieth part of a right angle, or one of the three hundred sixty equal parts into which the circumference of every circle is supposed to be divided. A *degree of latitude* is the 360th part of the earth's circumference north or south of the equator, measured on a great circle at right angles to the equator, and a *degree of longitude* is the same part of the surface east or west of any given meridian, measured on a circle parallel to the equator. Degrees are marked by a small ° near the top of the last figure of the number which expresses them; thus, 45° is 45 degrees. The degree is subdivided into sixty equal parts, called minutes; and the minute is again subdivided into sixty equal parts, called seconds; thus, 45° 12' 20" means 45 degrees, 12 minutes and 20 seconds. The magnitude, or quantity, of angles is estimated in degrees and parts of a degree. An angle is said to be of so many degrees as are contained in the arc of a circle intercepted between the lines which contain the angle, the vertex of the angle being the center of the circle; thus, we speak of "an angle of 90° or of 45° 24'." The length of a degree of circular measure depends upon the radius of the circle of the circumference of which it is a part, the length being greater, the greater the length of the radius. Hence the length of a degree of longitude is greatest at the equator and diminishes continually toward the poles, at which it equals 0. Under the equator a degree of longitude contains 60 geographical or 69.16 statute miles (See MILE). The degrees of latitude are found to increase in length from the equator to the poles, owing to the shape of the earth. At the equator, 1° of latitude equals about 68.7 miles; at 45°, 1° equals about 69.05 miles.

The term is also applied to the divisions, spaces or intervals marked on a mathematical, meteorological or other instrument, as a thermometer or barometer.

The name *degree* is also given to the title bestowed upon one who has successfully completed a prescribed course of study or training.

De Groot, de grote'. HUGO. See GROTIUS, HUGO.

De'ism, a system of philosophy which recognizes a great first cause, or a Supreme Being, distinct from nature or the universe. Deism is opposed to atheism and pantheism; it implies

Delagoa Bay

a disbelief in revelation, is skeptical as regards the value of miraculous evidence and assumes that the light of nature and reason are the only guides in doctrine and practice. In the last century there were a series of writers who are spoken of distinctively as the English deists. They include Collins, Toland and Tindal. See ATHEISM; PANTHEISM.

De Kalb', ILL., a city in De Kalb co., 58 mi. w. of Chicago, on the Chicago & Northwestern and the Chicago Great Western railroads. The Northern Illinois State Normal School is located here, and there are manufactures of wire, agricultural implements, wagons, shoes, gloves and other articles. The waterworks are owned and operated by the city. It was settled in 1838 and was incorporated in 1877. Population in 1910, 8102.

De Kalb, JOHANN. See KALB, JOHANN DE.

De Ko'ven, REGINALD (1859-), an American composer, born at Middletown, Conn. He studied at Stuttgart and Paris and later attended Oxford University, where he graduated in 1879. He devoted himself to composition and produced several popular operas and songs, among which are *Margery Daw*, *O Promise Me*, *Winter's Lullaby* and *Ask What Thou Wilt*. His leading operas are *Robin Hood*, *Don Quixote*, *The Fencing Master*, *Rob Roy*, *The Mandarin* and *The Red Feather*. He is the founder and conductor of the Washington Symphony Orchestra.

Delacroix, de lah krwah', FERDINAND VICTOR EUGENE (1799-1863), a French painter. He was the first to depart from the style of David and to found the Romantic School of 1830. His influence on French artists was very great, and with him and Géricault a change was brought about affecting every school of art in the world. This influence, perhaps more than his ability to paint, made him famous. His works are especially rich in colors. His first work, *Dante and Vergil in Charon's Bark*, is one of the best.

Del'ago'a Bay, in southeast Africa, a large sheet of water separated from the Indian Ocean by the peninsula and island of Inyack. The bay stretches north and south for about 70 miles, with a breadth of from 16 to 20 miles, and forms the southern extremity of the Portuguese settlement of Mozambique. It is available for vessels of large tonnage, though the presence of shoals, banks and flats hinders the navigation of the bay. The port and Portuguese settlement of Lourenço Marques has

become a place of considerable trade since the opening of gold mines in the Transvaal.

Deland', MARGARETTA WADE CAMPBELL. (1857-), an American author, born in Allegheny, Pa. She was educated in private schools and taught drawing in New York until 1880, when she married and removed to Boston. Her first novel, *John Ward, Preacher* (1888), was widely popular. Among her other books are *Old Chester Tales*, *Dr. Lavendar's People*, *The Awakening of Helena Richie* and its sequel, *The Iron Woman*, and a volume of poems.

De la Ramee, *de lah rah may'*, LOUISA. See RAMEE, DE LA, LOUISA.

Delaroche, *de la rosh'*, PAUL (1797-1856), probably the greatest painter of the French school. He studied landscape painting for a short time, but applied himself afterward to historical painting and rapidly rose to eminence. His subjects are principally taken from French and English history. There is little real feeling or sentiment in his works, but the pictorial effect is present to a high degree. Among his well-known pictures are *Death of Queen Elizabeth*, *Princes in the Tower*, *Joan of Arc* and *Napoleon at Fontainebleau*.

Del'aware, THE DIAMOND STATE, a Middle Atlantic state, one of the original thirteen, bounded on the n. by Pennsylvania, on the e. by the Delaware river and bay and the Atlantic Ocean, on the s. and w. by Maryland. Its length is 96 miles, its width is from 9 to 36 miles, its total area is 2370 sq. mi., of which 405 sq. mi. are water. Except Rhode Island it is the smallest state in the Union. Population in 1910, 202,322.

SURFACE. Except a small hilly section in the north, the surface is uniformly low and level and is generally sandy. In the extreme south there is much swamp land. The highest elevation is only 282 feet above the sea. The coast of Delaware Bay is marshy, and some of the land is enclosed by dykes and thus rendered tillable. The Atlantic coast has many sand beaches enclosing shallow lagoons. Near the western boundary, a low wooded ridge extends southward from the Christiana and Brandywine rivers. Cypress Swamp, on the southern border, is 12 miles long and 6 miles wide. The height of land between Chesapeake and Delaware bays divides the state into two drainage areas. To the west of this divide the rivers flow into Delaware River or the bay. To the east they flow into the Atlantic. The rivers of Delaware, though numerous, are all small and are unsuited to navigation.

CLIMATE. The climate is mild and healthful,

except in the south, where the swamps occasion fever. Autumn is particularly mild, and frosts seldom occur before about the middle of October. The mean temperature is about 55°. The average rainfall is about 49 inches.

AGRICULTURE. Delaware is an agricultural state. Improved farm lands occupy over 60 per cent of its entire area, a larger proportion than in any other state on the Atlantic coast. Only four states in the country (all North Central states) have a larger proportion than this. Delaware seems to be the natural home of the peach, while apples and small fruits and vegetables are raised in abundance for the New York and Philadelphia markets. Although fruit-growing is the chief industry, tomatoes, cereals, hops, tobacco, peas, beans, clover seed and flax are also important products. Fully 16,000 acres are planted to tomatoes each year. In the swampy districts are forests of cypress and evergreen trees.

OTHER INDUSTRIES. The principal manufacturing are steel and rolling mills, foundry and machine shops, ship-building yards, car-shops, tanning and canning and preserving works. The principal manufactures are at Wilmington. The great Edge Moor Bridge Works are near this city. At Dover fruit canning is the chief industry. Oyster and other fisheries are important and are growing each year.

TRANSPORTATION. Numerous railways bring the coal and iron fields of Pennsylvania within easy reach and render the markets at New York and Philadelphia accessible. The principal railroads in the state are the Baltimore & Ohio, the Philadelphia, Wilmington & Baltimore, the New York, Philadelphia & Norfolk. Good harbors at Wilmington, New Castle and Lewes, the canal connecting Chesapeake and Delaware bays and the navigability of the Delaware river and bay encourage coastwise and internal trade. A boat canal connects Chesapeake and Delaware bays, and the harbor at Lewes is protected by one of the largest breakwaters in the United States. There is some foreign commerce direct through Wilmington.

GOVERNMENT. The governor is elected for four years and may be re-elected, but is not eligible for a third term. The legislative department consists of a senate of 17 members and a house of representatives of 35 members. The members of the senate are elected for four years, and of the house for two years. The judiciary consists of six state judges, one of whom holds the office of chancellor and chief justice. The

Delaware

judges are appointed by the governor and confirmed by the senate. The state has one representative in the lower house of Congress.

EDUCATION. The state provides for the purchase of free text-books in the public schools. There are good schools for both white and colored children. The State Agricultural College (for colored students) is at Dover. Newark is the seat of Delaware College; Wilmington, of Wesleyan Female College.

State institutions are an insane asylum, schools for the deaf, dumb and blind and an industrial school for boys and girls.

CITIES. The principal cities are Dover, the capital, Wilmington and New Castle.

HISTORY. Lord Delaware sailed into Delaware Bay in 1611, but no settlement was established until 1631, when the Dutch founded a trading post near the present site of Lewes, Del. Somewhat later the Swedes built a fort at the present site of Wilmington, and the English also contemplated entering the territory. Control alternated between the Dutch and the Swedes until 1655, when the Dutch from New Amsterdam under Stuyvesant drove out their competitors; but in 1664 Delaware, together with New York, passed into the hands of the English. After that time it became the bone of contention between rival English claimants, especially the colonies of Maryland, New Jersey and Pennsylvania, the latter finally gaining control in 1682. In 1691 it was granted a separate assembly; two years later it was reunited to Pennsylvania, but in 1711 was recognized as a separate colony. During the Revolution, Delaware was loyal to the patriot cause, formed an independent state government in 1776 and was the first to ratify the Federal Constitution (December, 1787). Under the republic she rapidly gained in wealth and population. Though a slave-holding state, she remained faithful to the Union at the opening of the Civil War, but furnished many recruits to the Confederate army. At the close of the struggle, her legislature firmly resisted the passage of the amendments, and nowhere did race hatred reach a higher point. In recent years warring political factions of the Republican party have fought for control of the state, and as a result Delaware was long deprived of one United States senator and from 1901 to 1904 of both senators.

Delaware, a river of the United States, which rises in the Catskill Mountains in New York, separates Pennsylvania from New York and New Jersey, and New Jersey from Delaware, and

Delaware Water Gap

loses itself in Delaware Bay. It has a course of about 410 miles and is navigable for large vessels to Philadelphia and for smaller craft to the head of tide water at Trenton. Its chief tributaries are the Schuylkill and the Lehigh.

Delaware, OHIO, the county-seat of Delaware co., 24 mi. n. of Columbus, on the Whetstone (Olentangy) River and on the Cleveland, Cincinnati, Chicago & Saint Louis, the Hocking Valley and the Pennsylvania railroads. The Ohio Wesleyan University is located here. The city has a public library and contains railroad shops, foundries, flour mills and other manufactures. There are mineral springs in the vicinity. The city was incorporated in 1827. Population in 1910, 9076.

Delaware, an indian tribe belonging to the Algonquian family, originally known as living on the Delaware River, and called by themselves *Lenni-Lenape*. They had to leave their original settlements about the middle of the eighteenth century and go farther west. Later they were removed to the Indian Territory. Their numbers are now insignificant.

Delaware or **De la Warr**, THOMAS WEST, Lord (1577-1618), a British colonial governor in Virginia and the discoverer of Delaware Bay. At the age of twenty-five he was admitted to Queen Elizabeth's privy council, and in 1609 he was a member of the Council of Virginia in England. In the following year he was sent to Virginia as governor and captain general under the charter of 1609, arriving just as the colonists were embarking for England. He lived with the greatest pomp and splendor, but displayed ability and energy as an executive and helped firmly to establish a colony on a prosperous basis. In 1611 he left Virginia for the West Indies in search of health, but was driven by storm into Delaware River. He later returned to England and died while on a voyage to America.

Delaware Bay, a bay on the Atlantic Ocean between the states of Delaware and New Jersey. It is about 40 miles long, and its greatest width is 25 miles. At the entrance, near Cape Henlopen, is situated the Delaware Breakwater, which affords vessels a shelter within the cape. This breakwater was erected by the Federal government and cost about \$3,000,000. See **BREAKWATER**.

Delaware Water Gap, a narrow gorge in the Kittatinny Mountains, on the borders of Pennsylvania and New Jersey, through which the Delaware River flows. The mountains on

each side rise to a height of 1400 feet above the water and form very beautiful scenery.

Delcasse, *del ka say'*, THEOPHILE (1852-), a French statesman. His first prominent office under the government was that of minister of the colonies in 1894, and later he was foreign minister in several administrations. In 1899 he acted as mediator between the United States and Spain; he was conspicuous in the negotiations following the Boxer uprising in China in 1900, and he secured an important Anglo-French agreement in 1904. In 1911 he became minister of marine and in 1913 ambassador to Russia.

Delft (formerly Delf), a town in the Netherlands, 8 mi. n. w. of Rotterdam, on a canal between it and the Hague. Among its buildings are the townhall; the Prinsen-hof, the scene of the assassination of William the Silent, now a museum; the old Reformed church; the new church, containing monuments to William I and Hugo Grotius and the burial vaults of the present royal family. Formerly the town was especially famous for its manufacture of an earthenware known as Delftware (See POTTERY). Population in 1910, 34,388.

Delhi, *del'le*, or **Dehli**, *da'le*, a city of Hindustan; on the Jumna River in the Punjab, about 954 mi. n. w. of Calcutta. It was formerly the capital of the Mogul empire and the largest city of Hindustan, having once had a population of 2,000,000. In 1911, on the occasion of the visit of King George V to India, the capital was restored to Delhi, a move which added much to Britain's strength in the entire province. A vast tract, covered with the ruins of palaces, pavilions, baths, gardens and mausoleums, marks the extent of the ancient metropolis. The present city is surrounded on three sides by a stone wall 30 feet high. The palace or residence of the Great Mogul, built by Shah Jehan, commenced in 1631, and now known as the fort, is situated in the east of the city. It has great towers, surmounted by elegant pavilions, marble domes and gilded minarets. Since the Sepoy Mutiny of 1857 a great portion has been demolished, in order to make room for military barracks. Among modern buildings are the government college, founded in 1792, the Residency and a Protestant church. Population in 1911, 232,837.

Delirium Tremens, an affection of the brain, which arises from the inordinate and protracted use of ardent spirits. It is therefore almost peculiar to drunkards. The principal symptoms of this disease are delirium and trem-

bling. The delirium is a constant symptom, but the tremor is not always present, or, if present, is not always perceptible. Frequently the sufferer is thrown into paroxysms of terror, by thinking he sees snakes or other animals, or the most frightful and grotesque objects.

De Long', GEORGE WASHINGTON (1844-1881), an American Arctic explorer, born in New York City. He was educated in the public schools at Brooklyn. In 1865 he graduated from the United States Naval Academy. He commanded an exploring expedition to the Arctic regions which resulted in a number of important discoveries, but ended in disaster. De Long, with all of his party except two, died of starvation. See NORTH POLAR EXPLORATION.

De'los, an island of great renown among the ancient Greeks, fabled to be the birthplace of Apollo. It was a center of his worship and the site of a famous oracle. It is the central and smallest island of the Cyclades, in the Aegean Sea. Delos is now deserted, but it is covered with ruins.

Delphi, *del'fi*, an ancient Greek town in Phocis, originally called Pytho, the seat of the famous oracle of Apollo. The oracles were delivered by the mouth of a priestess, who was seated on a tripod above a subterranean opening, whence she received the vapors ascending from beneath and with them the inspiration of the Delphian god. The oracular replies were always obscure and ambiguous; yet they served, in earlier times, in the hands of the priests, to regulate and uphold the political, civil and religious relations of Greece. Delphi was also one of the meeting places of the Amphictyonic Council of the Greeks (See AMPHICTYONIC COUNCIL), and near it were held the Pythian games.

Delphos, *del'fos*, OHIO, a city of Allen and Van Wert cos., on the Miami & Erie Canal, 74 mi. s. w. of Toledo, and on the Toledo, Saint Louis & Western, the Pennsylvania and other railroads. Oil is found, and the water power is excellent. The city has railroad repair shops and manufactures of barrels and furniture. It was first settled in 1834. Population in 1910, 5038.

Delsarte, *del sahr't'*, FRANCOIS ALEXANDRE (1811-1871), a musician and investigator, born at Solesmes, France. He composed a few melodies and wrote several romances, but was chiefly known as a teacher of singing, declamation and physical culture. The latter he conducted according to an original method, in

Delta

which he combined physiological and psychological principles, for the attainment of grace and poise.

Del'ta, the name applied to plains formed at the mouths of rivers. The term originated with the Greeks, who first applied it to the plain formed by the mouth of the Nile, because of its triangular shape, resembling the Greek letter *delta*. Deltas are caused by the meeting of the river's current with an inflow from the sea, so that the outflowing current is slackened, and most of the silt which it holds in suspension is deposited. If the sea is quiet, this action soon builds up a plain which reaches to the surface. Vegetation takes root from this, and in time it becomes firm land. Deltas will not form where the sea is agitated by strong winds or where tides produce high waves, because these movements wash away the sediment; hence deltas never exist in broad estuaries like the Gulf of Saint Lawrence. The most noted deltas in the world are at the mouths of the Nile, the Mississippi, the Ganges, the Brahmaputra, the Hoang-ho, the Po and the Mackenzie. Some of these are very large, that of the Brahmaputra having an area of 50,000 square miles, and that of the Nile, about 20,000 square miles. The land of the deltas is usually very fertile, and if of sufficient elevation to drain, it is unusually valuable for agricultural purposes. See RIVER; EROSION.

Deluge, *del'uje*, a flood, supposed by many people to have destroyed nearly all the human and animal life on the globe. An account of, or a belief in, such a flood is to be found among the earliest inhabitants of America, but none exists among the Africans and none in Europe, except among the Greeks. The ancient literary works of Persia, Babylonia, Syria, Asia Minor, India and of the Hebrews show a belief in a flood. But geological investigations and discoveries show that if there was a deluge, the one most vividly described in the Bible (*Gen. vi-viii*) must have covered a comparatively small territory. The Babylonian story is much like that of the Hebrews, which it antedates, and it is claimed by some that both are derived from the same Semitic tradition; others that one is the copy of the other, the Babylonian account being a myth.

Demand' and Supply'. See VALUE.

Demén'tia. See INSANITY.

Deme'ter. See CERES.

De Mille, *deh mil'*, JAMES (1837-1880), a Canadian author. He studied at Brown Uni-

Democritus

versity, and after teaching for some years in Acadia College he was made professor of history and rhetoric in Dalhousie College. Among his works are *Andy O'Hara*, *The Soldier and the Spy*, *The American Baron* and *The Living Link*.

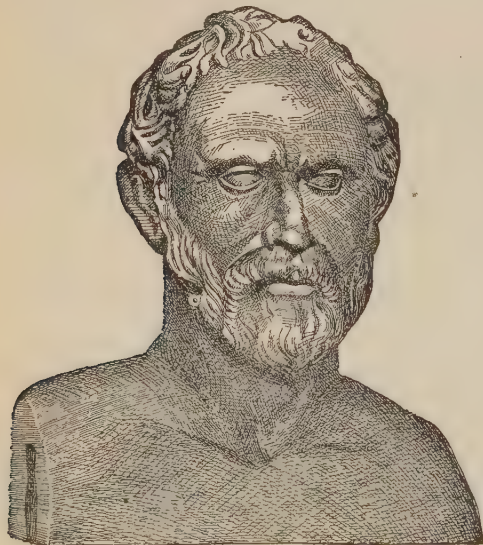
Democ'racy. See GOVERNMENT.

Dem'ocratic Party, the name given to the party in American history which was the successor of the Republican or Democratic-Republican or Anti-Federalist party, its fundamental doctrine being the application of the most democratic principles to the government. Specifically, it urged the strict construction of the Constitution and the strengthening of the state governments at the expense of the national government. It first came to power in 1801, with the election of Jefferson, and retained control of the national government continuously from that time until 1825, when John Quincy Adams, a former Democrat, but recently converted to the principle of loose construction and centralization, was elected over Andrew Jackson, the Democratic candidate. It returned to power in 1829, with the election of Jackson, was defeated in 1841 by William Henry Harrison, the Whig candidate, and again in 1848 by Taylor, a Whig, owing to a quarrel among New York State Democrats (See BARNBURNERS). Thereafter, it was continuously successful until the election of Lincoln in 1860. The issue of slavery and the Civil War caused a serious division in the party, and it did not again become united until ten years after the war, when, with Samuel J. Tilden as a candidate, the party gained a majority of the popular vote, though Tilden was defeated by the electoral commission (See ELECTORAL COMMISSION). In 1884 its candidate, Grover Cleveland, was chosen president, was defeated in 1888 and was again elected in 1892. For a detailed history of the party, its principles and its relations to other political parties, see POLITICAL PARTIES IN THE UNITED STATES; UNITED STATES, subhead *History*.

Democ'ritus (470-370 B. C.), a Greek philosopher of the new Eleatic school, a native of Abdera. He was called "the laughing philosopher," from his habit of laughing at the follies of mankind. He explained the origin of the world by the eternal motion of an infinite number of invisible and indivisible bodies or atoms, which differ from one another in form, position and arrangement, and which have a primary motion that brings them into contact and forms innumerable combinations, the result

of which is seen in the productions and phenomena of nature.

Demosthenes, *de mos'the neez* (about 383-322 B. C.), a famous Greek orator. His father left him a considerable fortune, of which his guardians attempted to defraud him. Demosthenes at the age of seventeen years conducted a suit against them himself and gained his cause. He then set himself to study eloquence, and though his lungs were weak, his articulation defective and his gestures awkward, by perseverance he at length surpassed all other orators in power and grace. Against Philip of Macedon, who was attempting to place himself at the head of the Greek states, he directed his famous orations known as the *Philippics*, and he labored



DEMOSTHENES

to get all the Greeks to combine against the encroachments of Philip. He was present at the Battle of Chaeronea (380 B. C.), in which the Athenians and Boeotians were defeated by Philip and Greek liberty was crushed. On the accession of Alexander in 336, Demosthenes tried to stir up a general rising against the Macedonians, but Alexander at once adopted measures of extreme severity, and Athens sued for mercy. It was with difficulty that Demosthenes escaped being delivered up to the conqueror. In 324 he was imprisoned on a false charge of having received a bribe from one of Alexander's generals, but managed to escape into exile. On the death of Alexander in the next year he was recalled, but the defeat of the Greeks by the Macedonians caused him to seek

refuge in the temple of Poseidon, in the island of Calauria, on the coast of Greece, where he poisoned himself to escape from the emissaries of Antipater. The character of Demosthenes is by most modern scholars considered one of the noblest in history.

Demur'rer, in law, a stop at some point in the pleadings, caused by a demand by one party to an action, for the court's judgment as to whether the facts, if admitted, are not insufficient to be a basis of action in law. It is now used to show legal reasons why the case should not proceed. See **PROCEDURE**.

Dena'rius, a Roman silver coin, originally worth 10, and later 16, of the pieces called *as*, the change being made when the weight of the *as* was reduced, on account of the scarcity of silver. The denarius was equivalent to about 14 cents of our money. There was also a gold denarius, equal in value to 25 silver ones.

Den'ison, TEXAS, a city in Grayson co., 72 mi. n. of Dallas, on the Saint Louis & San Francisco, the Missouri, Kansas & Texas, the Texas & Pacific and other railroads. It is an important railroad center in an agricultural country, producing grain, cotton, fruits and vegetables, and it contains cotton, cottonseed oil and flour mills and manufactures of mattresses, machinery, ice and other articles. The important buildings include the Saint Francis Xavier's Academy and the Washington School. It was settled in 1872. Population in 1900, 11,807; estimated in 1910, 13,632.

Den'mark, a kingdom of Europe, made up of the peninsula of Jutland and several islands in the Baltic Sea. It lies between 54° 34' and 57° 44' 52'' north latitude, and between 8° 4' and 12° 45' east longitude. It is bounded on the n. by the Skagerrak; on the e. by the Cattegat, the Sound and the Baltic; on the s. by the Baltic and the district of Schleswig, and on the w. by the North Sea. It has an area of 15,388 square miles, almost twice that of the State of Massachusetts.

SURFACE AND DRAINAGE. The west coast of Jutland is low and sandy, while the east coast is level, contains several excellent harbors and is indented with fjords or firths, the most noteworthy being the Lymfjord, or Lumfjord, stretching across Jutland. The inland surface of Denmark is low, generally, though diversified with a range of hills across the middle part of Jutland, the highest points of which are 600 feet above sea. There are no lakes or rivers of note, the largest being the Guden,

Denmark

which has a length of 100 miles. The largest islands are Seeland (Zealand) and Finen.

INDUSTRIES. Denmark is the poorest of European countries in mineral resources. Peat is found in the west and north of Jutland, but no metallic ores of any kind appear.

The country is important as an agricultural district. Among the products grown are rye, barley, potatoes and beets. Stock raising and dairy husbandry are also very important industries. The forests are mostly made up of beech, though formerly the oak and ash were common.

Manufacturing is not an important industry. Porcelain is made extensively in Copenhagen, the capital, and other manufactures include locomotives, machinery, wool, linen and cotton. There are also many sugar refineries and a little iron smelting.

TRANSPORTATION. Most of the cities are situated on the coast or on navigable rivers. Steamboats run between the islands. The first railroad was opened for use in 1847, and after 1880 most of the railroads belonged to the State. The exports are mostly animal and dairy products, while the imports include cereals, coal, cotton, iron, manufactures and textiles. Germany, Great Britain, United States, Sweden, Norway and Russia are the leading countries connected with the trade.

EDUCATION. Denmark has a good system of education. The chief institution is the University of Copenhagen, founded in 1479. There are, besides, about twenty agricultural colleges, a college of pharmacy, the royal academy of arts and about one hundred commercial and technical schools.

GOVERNMENT AND RELIGION. The government of Denmark is a constitutional monarchy. The present constitution dates from 1849, and by it the executive power is vested in the king, and the legislative power lies in the king and a diet, or *Rigsdag*, consisting of the *Landsting*, or upper house, and the *Folkething*, or popular chamber. The former is composed of 66 members, 12 of whom are appointed by the king and the rest chosen for eight years by the people. The *Folkething* is composed of 114 deputies, elected by universal suffrage for a period of three years. All money bills must be submitted by the government first to this body. The established religion is Lutheran, but toleration is extended to all creeds.

COLONIES. The colonial possessions of Denmark consist of territories in Europe and

Denmark

America, having an aggregate area of 86,634 square miles, and a total population of 120,890.

CITIES. The chief cities are Copenhagen, Aarhus, Aalborg, Odense and Horsens.

LANGUAGE AND LITERATURE. The Danish language belongs to the Scandinavian branch of the Teutonic family of languages and is closely allied to the Swedish and Norwegian. It is the most modern of the Scandinavian languages, soft and rather monotonous, with shades of sound difficult for a foreigner to acquire. It is written either in the German or the Roman characters. From the long union of Norway with Denmark, Danish became the written language of the Norwegians and is still to a large extent the language of the educated classes.

The oldest Danish book is a treatise on medicine, which dates from the first half of the thirteenth century. The first really literary writings were series of ballads, which were probably composed between the fourteenth and sixteenth centuries. During the Reformation period, Christian Pedersen (1480-1554) did for the Danish language what Luther did for the German, by publishing a translation of the New Testament and the Psalter, and later, the complete Bible. Modern Danish literature begins with the period succeeding the Reformation, with hymns, scriptural dramas and moral tales. A new effort began with Ludvig Holberg (1684-1754), who infused new spirit into all branches of Danish intellectual life. He was also the founder of the Danish stage. Contemporary with him was the lyric and dramatic poet Johannes Ewald. Heiberg, critic, poet and dramatist, and Jens Baggesen (1764-1826), are the chief comic dramatists of the nation. Fresh life was again infused into Danish poetry by Adam Oehlenschläger (1779-1850), contemporary with whom was Adolph Wilhelm Schack von Staffeldt, a lyric poet of high order. The greatest names in Danish literature since Oehlenschläger have been Hans Andersen (1805-1875), who won world-wide reputation by his fairy tales; Paludan-Müller (1809-1876), and Georg Brandes, critic and literary historian. It is Brandes who has, more than any other one man, introduced into Danish thought and letters modern European ideals and tendencies.

HISTORY. After the decline of the Roman Empire, the peoples of the Scandinavian countries began to make themselves felt throughout Europe by reason of their warlike and adven-

Denmark

turous spirit. They conquered Normandy, successfully invaded England in the ninth century and even sent voyagers as far as America. Early in the eleventh century, Canute, king of Denmark, established a firm hold on England. He was one of the most powerful rulers of his age, and it was during his rule that Christianity was firmly established in Denmark. For three centuries following Canute, Denmark was in a state of upheaval and, although there was an occasional strong and even brilliant ruler who brought the country to something like the position it had had in Canute's time, most of the kings were weak. Margaret, called the "Semiramis of the North," ruled in Denmark from 1375 to 1412, and she gave the country a strong government. By the Union of Kalmar, in 1397, Denmark, Norway and Sweden were united under one sovereign, and Margaret's nephew, Eric, was appointed her heir. He proved, however, to have none of her great qualities, and he speedily lost his triple kingdom, each country choosing its own ruler. By 1448 the Danes, tired of the misrule, chose, as king, Christian of Oldenburg, who established the line which reigned until 1863. The choice of Christian as ruler, also, of Schleswig and Holstein, and the fact that the ruler of Holstein, which was a part of the Holy Roman Empire, had a voice in the German Diet, led centuries later to the most important consequences. See SCHLESWIG-HOLSTEIN.

During the reign of Christian II (1513-1523), Sweden, under Gustavus Vasa, gained its freedom, and it was never again united to Denmark. The latter country during the sixteenth century began to have a part in European affairs, and Christian IV (1588-1648) took an important part in the Thirty Years' War (See THIRTY YEARS' WAR). The choice of the king of Denmark was by election until 1660, but in that year the king, Frederick III, succeeded in having the kingship declared hereditary in his family.

As an ally of Napoleon, Denmark was involved in war with Sweden, England, Russia and Prussia. Copenhagen was bombarded by the British fleet in 1807, and seven years later Norway was ceded to Sweden. Holstein, feeling itself to be entirely German, had never been satisfied with the Danish rule, and when in 1846 the Danish king declared his intention of making the Danish monarchy permanently indivisible, a rebellion broke out in Schleswig and Holstein among the German element. It

Dental Schools

was put down by 1851, though it was supported by Germany. Christian VIII had in the meantime granted to Denmark an extremely liberal constitution, but this did not allay the discontent of the German element of Schleswig-Holstein, and when in 1863 Prince Christian of Glücksburg came to the throne as Christian IX, Schleswig and Holstein declared for a different ruler. Prussia and Austria determined to unite in settling the Schleswig-Holstein matter, and war was begun with Denmark in 1864. As a result Denmark was forced to resign all claims to Schleswig and Holstein, and two years later the duchies passed finally under the control of Prussia. Of late years, perhaps the most important event in Danish history has been the necessity of allowing a constitutional government to Iceland. Denmark, through the marriage of the children of Christian IX into many reigning families of Europe, came during the latter half of the nineteenth century into very close relationship with many of the European powers. Population in 1911, 2,775,076.

Den'nison, WILLIAM (1815-1882), an American politician, chiefly celebrated as the "war governor" of Ohio. He was born in Cincinnati and was educated at Miami University. He began the practice of law in 1835. In 1848 he was elected to the state legislature and in 1860 he became governor of Ohio. President Lincoln appointed him postmaster-general in 1864, and he remained in that position two years.

Den'sity, in physics, the quantity of matter contained in a body of a given bulk, relative to the quantity contained in the same bulk of a different substance, chosen as the standard. If a body of equal bulk with another contains double the quantity of matter, it is of double the density. Or if a body contain the same quantity of matter as another, but under a less bulk, its density is greater in proportion as its bulk is less than that of the other. Hence the density is directly proportional to the quantity of matter and inversely proportional to the bulk or magnitude. The relative quantities of matter in bodies are known by their gravity or weight, and when a body, mass, or quantity of matter is spoken of, its weight is always understood, that being the proper measure of the density or quantity of matter. See GRAVITY, SPECIFIC.

Den'tal Schools, professional schools founded for the purpose of giving technical training in dentistry and dental surgery. The

Dentine

first school of this sort in the world was established at Baltimore in 1839. Six years later the Ohio College of Dental Surgery was founded, and this was followed by a school in Pennsylvania; then others were organized in rapid succession. Most of the larger universities now maintain dental departments. These departmental schools and the independent schools in the United States number about sixty. The requirements for admission are a high school course or its equivalent, and most of the best schools require four years' study and practice for graduation. See DENTISTRY.

Dentine, *den'tin*. See TEETH.

Dentiphone, *den'te fone*. See AUDIPHONE.

Den'tistry, the art of cleaning, extracting, repairing and replacing teeth. There are two very distinct departments in dentistry, the one being *dental surgery*, the other what is known as *mechanical dentistry*. The first requires an extended medical knowledge on the part of the practitioner, as, for instance, a knowledge of diseases whose effects may reach the teeth, of the connection between the welfare of the teeth and the general system, as well as ability to discern latent diseases of the mouth. The chief operations in this department are *scaling*, or removing the tartar which has accumulated on the base of the teeth; *regulating*, the restoring of overcrowded and displaced teeth to their proper position; *stopping*, *stuffing* or *filling*, the filling up of the hollow of a decayed tooth to prevent the progress of decay; *extracting*, a process requiring considerable muscular power and delicacy of manipulation. The second department, mechanical dentistry, is concerned with the construction of artificial substitutes for lost teeth and requires much mechanical skill, it being a very delicate work to give artificial teeth a perfectly natural appearance in shape and color. The actual construction of the teeth, however, has passed largely into the hands of the manufacturers, and the dentist has only the selecting, fitting and fixing to do. In the United States, the Baltimore College of Dental Surgery, chartered in 1839, was the first school for the training of dentists, but now about sixty such institutions are in operation. *The American Journal and Library of Dental Science* was established in Baltimore in 1839. *The Dental News-Letter* was established in 1847 at Philadelphia, and in 1859 its name was changed to the *Dental Cosmos*, in which form it is now the most popular periodical in the profession. Every state has now its state

Denver

dental society, and there are several national organizations, of which the American Dental Association is among the most important.

Den'ver, *COLO.*, the capital and chief city of the state, is situated on the South Platte River at its confluence with Cherry Creek, 1026 mi. w. of Chicago, and 1457 mi. e. of San Francisco. Twelve railroads furnish excellent transportation facilities in all directions. The city is built upon an undulating plateau, 10 miles from the foothills of the Rocky Mountains and one mile above the sea, and is divided by creek and river into three sections known as East, West and North Denver. From pioneer days its favorable location and salubrious climate have made it the favorite place of residence for the live-stock growers of the plains, the mine owners of them mountains and health seekers from the East; and while smelting, meat packing, milling, brewing and other industries flourish, its residential requirements have been the chief factor in shaping the city's development. In harmony with these requirements, most of its broad and regular streets are paved or surfaced, its school buildings are of superior excellence and well equipped, and its churches, hospitals, parks and places of amusement are all maintained at a higher standard than usually prevails in cities of like size. The street car service is excellent and the supply of pure water from the mountains abundant.

City Park, in the eastern portion of the city, has an area of 320 acres and in addition to the usual features of a well-kept park contains artificial lakes, a zoölogical garden and a museum of natural history. Among the seventeen other parks, Washington, Congress and Lincoln are worthy of mention.

The most prominent structure in the city is the state capitol, occupying an eminence in the east central part of the city and constructed of Colorado granite at an expense of \$3,250,000. Other buildings worthy of mention are the union depot, the United States postoffice and customhouse, the United States mint, the courthouse, Equitable Building and Brown Palace Hotel. The important churches are Trinity Methodist and the Central Presbyterian.

Among the important educational institutions of the city are the University of Denver (Methodist), the Iliff School of Theology, the College of the Sacred Heart (Roman Catholic) and Wolf Hall (Episcopal). The city library contains about 100,000 volumes and is housed in an imposing edifice, completed in 1908.

Denver is an important distributing point for the country west of the Mississippi River, and is the leading market of America for mining machinery.

The city was settled in 1858 as Auraria, on the west side of Cherry Creek, and as Saint Charles, on the east side. In the following year the rival villages were united and incorporated as a city and named Denver, for General J. W. Denver, who at the time was governor of the territory of Kansas, which then included Colorado. It was made the capital of the territory of Colorado in 1867, and was the county-seat of Arapahoe County until 1902, when it became "The City and County of Denver" and was vested with unusual powers and prerogatives, including a form of initiative and referendum. Population in 1910, 213,381.

Denver, UNIVERSITY OF, an institution of higher learning, founded at Denver, Colo., in 1864, under the name of Colorado Seminary. It comprises a college of liberal arts, a graduate school, the Denver and Gross College of Medicine, the Denver Law School, the Iliff School of Theology, the Colorado College of Dental Surgery and a college of music. The university owns and occupies twelve buildings, of which only three are in the heart of Denver, the others being at University Park, a suburb of the city. The faculty contains 175 members, the enrollment is over 1300, and the library contains 12,000 volumes.

Department, the name given to the principal territorial divisions of France. At the time of the French Revolution departments replaced the old provinces, the change being voted in the Constituent Assembly in 1790. There are at present eighty-seven departments, each of which is subdivided into arrondissements.

De Pauw' University, a Methodist Episcopal institution of higher learning, founded at Greencastle, Ind., in 1837 and named for W. C. De Pauw, by whom it was liberally endowed. It has over thirty instructors, more than 800 students and a library of 30,000 volumes.

Depew', CHAUNCEY MITCHELL (1834-), an American orator, lawyer and legislator, born in Peekskill, N. Y. He graduated at Yale in 1856; in 1861 was a member of the New York Assembly, and in 1863 was elected secretary of state of New York. In 1866 he became attorney for the Harlem Railroad Company, and he rose rapidly as a railroad lawyer. In 1882 he became second vice-president of the New York Central & Hudson River Railroad Company, of which

he had long been counsel, and in June, 1885, he was elected to the presidency of the road. He was made chairman of the board of directors of the whole Vanderbilt system of railroads in 1898 and also director in many other corporations, including some of the largest companies in the country. From 1899 to 1911 he was United States senator from New York. Depew's reputation rests chiefly upon his ability as a public speaker, especially on festal occasions.

De Peyster, de pise'ter, JOHN WATTS (1821-1907), an American author, born in New York. Because of ill health he did not graduate at Columbia, where he studied, but later he received honorary degrees from various colleges and was elected a member of many historical, scientific, military and patriotic societies on both sides of the Atlantic. He is chiefly known for his work in the New York militia, of which organization he was brevetted major general in 1866, his help in organizing the New York fire and police departments, and his extremely numerous writings. He has written fiction; many pamphlets of military, historical and biographical kinds, and many longer works, including *The Dutch at the North Pole* and *Personal and Military History of General Philip Kearny*.

De Quincey, de kwin'sy, THOMAS (1785-1859), a well-known English author, born in Manchester. In 1803 he matriculated at Oxford, and it was in the second year of his course there that he began to take opium in order to relieve severe neuralgic pains. The habit gained a strong hold on him, but after years of indulgence in it he was able to shake it off partly, so that he was capable of regular work. On leaving college he settled at Grasmere, Westmoreland, in the vicinity of Wordsworth and Southey, and devoted himself to literary work. Here or in London he remained till 1828, reading voraciously and writing for the *London Magazine*, *Knight's Quarterly Magazine* and latterly *Blackwood's Magazine*. From 1828 to 1840 he lived in Edinburgh, then removed with his family to Lasswade, which continued to be his headquarters. His *Confessions of an English Opium Eater*, which was published in the *London Magazine* in 1821, first won him wide notice, and it has remained his chief contribution to literature, although many of his other works are noteworthy. Among these others may be mentioned *Murder Considered as One of the Fine Arts*, *The English Mail Coach*, *Joan of Arc*, *Literary Reminiscences*, in which he deals with Lamb, Coleridge, Wordsworth and Southey,

as well as Shelley, Keats, Goldsmith, Pope and others; and a very interesting series of *Auto-graphic Sketches*.

Derby, *dur'by*, CONN., a city in New Haven co., 10 mi. w. of New Haven, at the confluence of the Naugatuck and the Housatonic rivers, and on the New York, New Haven & Hartford railroad. The streams furnish good water power and the place is an important industrial center, containing manufactures of typewriters, pianos, organs, hardware, pins, firearms and various other articles. The place was settled in 1646 and was known as Paugasset until its incorporation in 1675. It was made a city in 1893 by consolidation with the borough of Birmingham. Population in 1910, 8,991.

Derby, a municipal borough in England, capital of Derbyshire, on the Derwent, 35 mi. n. e. of Birmingham. It has some fine public buildings, among which are the churches of All Saints and Saint Alkmund, the county hall and a school of art, a free library and a museum. The principal manufactures are lace, silk, cotton, paper, articles in Derbyshire spar, castings and porcelain. Derby is one of the oldest towns in the kingdom and is supposed to owe its origin to a Roman station, Derventio, situated at Little Chester, on the opposite side of the river. Population in 1911, 123,433.

De Reszke, *de resh'ke*, EDOUARD (1856—), a Polish bass singer, brother of Jean De Reszke. He made his début in Paris in 1876. After 1884 he made several tours of the world, singing in leading operatic rôles. For more than ten years he was engaged almost continuously with the Metropolitan Opera Company of New York City.

De Reszke, JEAN (1853—), a Polish operatic tenor. His voice early attracted attention, and after studying under eminent instructors he made his début in Venice in 1874 as a barytone. The appearance was far from a success, and he retired, reappearing in 1879 in the tenor rôle of *Robert le Diable*. Since that time his singing has received the highest praise.

Der'rick, a device for lifting heavy weights and moving them short distances. The derrick usually has a tall mast, supported by ropes attached to its top and anchored to the ground. In the foot of the mast is a strong iron pin, which fits into a socket in the base upon which it rests. A boom is attached to the mast a few feet from the ground and can have its upper end lowered or raised as desired. The boom contains the tackle blocks used in lifting the weight

(See BLOCK; CABLE). A rope connects the tackle block with a system of wheel work at the foot of the mast, to which the power is applied. The weight is moved by turning the mast and thus swinging the boom around. Derricks are used in stone quarries and yards and factories where heavy machinery is made, on wrecking cars of railways, in building stone walls and in the erection of large buildings. In most manufactories the traveling crane has taken the place of the derrick.

Derrick Crane, a kind of crane combining the advantages of the common derrick and those of the ordinary crane. The jib of this crane is fitted with a joint at the foot and has a chain instead of a tension bar attached to it at the top, so that the inclination, and consequently the sweep, of the crane can be altered at pleasure. See CRANE; DERRICK.

Dervish, *dur'vish* (poor), a Mohammedan devotee, distinguished by austerity of life and the observance of strict forms. There are many different orders, some of whom live in monasteries, while some lead an itinerant life, and others devote themselves to menial or arduous occupations. They are respected by the common people, and the mendicants among them carry a wooden bowl into which the pious cast alms. One of their forms of devotion is dancing, or whirling about; another is shouting or howling, uttering the name *Allah*, accompanied by violent motions of the body, till they work themselves into a frenzy and sometimes fall down foaming at the mouth. They are credited with miraculous powers and are consulted for the interpretation of dreams and the cure of diseases.

Desault, *de zo'*, PIERRE JOSEPH (1744—1795), one of the most celebrated surgeons of France. He became principal surgeon in the hospital De la Charité and in 1788 was put at the head of the great Hôtel Dieu in Paris. Here he founded a surgical school, in which many of the most eminent surgeons of Europe were educated. The famous Bichat was one of his pupils.

Descartes, *da kahrt'*, RENE (1596—1650), the first great modern philosopher. He was educated at the Jesuit College at La Flèche, where he gave evidence of remarkable intellectual power. After spending five years in Paris and eleven years in traveling and as a soldier, he settled in Holland, where he developed his philosophical system.

Early in life Descartes recognized the inconsistencies of the various systems of philosophy

and sought to found an entirely new system. He doubted all forms of existing knowledge and found the only incontestable fact to be his own existence as a doubting, thinking being. He is the originator of the expression, "*Cogito, ergo sum*" (I think; therefore I exist). Upon this principle he constructed his philosophical system by a method of reasoning essentially mathematical. Beginning with his own self-conscious existence, he established first the fundamental truth of the existence of God, by reasoning that though finite creatures, we have an idea of a perfect being; therefore such perfection must exist, for there must at least be as much reality in the cause which produced the idea as in the effect or the idea itself. The principles thus absolutely and directly known were classified as innate ideas. Descartes's course of reasoning profoundly influenced the thought of the seventeenth century and gave direction to the development of modern philosophy. He was also the inventor of analytic geometry and otherwise influenced the development of mathematics and of physical science. His most important works are *Essays and Principles of Philosophy*. See PHILOSOPHY.

Descent, *de sent'*, in law, the transmission of the title to real property to the heir, on the decease of the proprietor, by the mere operation of law. The rules of descent are fixed by state laws in the United States, but the principle determining to whom an estate belongs on the decease of the proprietor is generally that of consanguinity, or relationship by blood, though in some states the widow or widower is admitted to a share. The laws are founded upon the principle of equal distribution among heirs of the nearest surviving degree. Kindred in blood are divided into three general classes, namely, 1, descendants; 2, ancestors; 3, collateral relatives, that is, those who have descended from the same common ancestor. Lineal descendants are preferred heirs, but in lack of these, the estate goes to ancestors, and, finally, in lack of these, to collateral heirs. In the last case, the civil law computes the degrees by counting the generations up to the common ancestor, as father, grandfather, great-grandfather; and from him or her down to the collateral relative, as brother or cousin, making the degree of relationship the sum of these two series of generations. Personal property left by one dying intestate is first used to pay all debts, and the remainder is distributed by an administrator in accordance with state laws,

usually to next of kin of the deceased. By English common law it went to the administrator.

Desert, *des'urt*, in its broadest meaning, a region which supports neither plant nor animal life; but as ordinarily used in geography, the term is restricted to the barren regions of the torrid and temperate zones. Deserts are found in all the continents, the most extensive areas occurring in Asia, Africa and Australia. Of all deserts, the Sahara is the most widely known. It extends across Africa from east to west between the twentieth and thirtieth parallels of north latitude, and a continuation of this region forms the Arabian Desert and the great Desert of Gobi in Asia. The Kalahari Desert occupies a large region in South Africa between the Zambesi and the Orange and Limpopo rivers. In the central part of Australia is also a large desert region. Another occurs in the northern part of Chile in South America, and in the United States there is a desert region extending from Mexico into Canada and confined mostly to the stretch of country between the Rocky and Sierra Nevada mountains. This is broken up into sections, each of which has a special name.

The surface of deserts is usually rough and contains dunes formed by drifting sand and gravel, and may contain bluffs that have been sculptured by rivers which traversed the region in former ages. In nearly all cases the soil is fertile and only needs water to make it productive. This has been amply demonstrated by irrigation in various portions of the desert of the United States and in deserts in other parts of the world. Deserts are usually caused by the location of surrounding mountain systems which cause the air passing over them to deposit its moisture on their outward slope. The Sahara is due largely to the intense heat of the atmosphere which passes over its surface. This rise in temperature so increases its capacity for moisture that it has a dry atmosphere, and under these conditions rainfall is impossible.

Des Moines, *de mo'in'*, IOWA, the capital of the state and the county-seat of Polk co., is located slightly south of the geographical center of the state, 170 mi. w. of the Mississippi and 140 mi. e. of the Missouri River, at the confluence of the Des Moines and Raccoon rivers, and on the Chicago, Rock Island & Pacific, the Chicago & Northwestern, the Chicago Great Western, the Wabash, the Chicago, Milwaukee & Saint Paul, the Chicago, Burlington & Quincy, the Minneapolis & Saint Louis and the Saint



THE DESERT

The lower picture is the desert of hot, blinding sands. It is not entirely flat as far as the eyes can see, for hills and dunes of sand abound. In the midst of the desert are Oases, one of which, near Algeria, is shown above. An oasis may be only large enough to sustain the lives of two people, and it may be so extensive in area that two million can live upon it.

Des Moines River

Paul & Des Moines railroads and several inter-urban lines. The public buildings are the state capitol, costing \$3,000,000, the State Historical building, costing \$500,000, containing a rare collection of relics and papers pertaining to the state's history, the public library, the new post-office, the county building, costing \$1,000,000, the new municipal building, the Coliseum, seating 10,000 people and erected by popular subscription, the Auditorium, seating 3000 people and the Y. M. C. A. and Y. W. C. A. buildings. Des Moines is the home of Drake University, Highland Park College and Des Moines College. The public school enrollment of the city is 17,000 and the public school buildings have cost \$1,750,000. The city has over 90 churches.

Des Moines is governed by a system of municipal administration known as the *Des Moines Plan*. All the city affairs are handled by a council of five men, each of whom has charge of a special department (See MUNICIPAL GOVERNMENT, subhead *Commission System*). The initiative and the referendum are embodied in the Des Moines Plan.

Des Moines is the third city in the United States in the distribution of farm implements and is the great wholesale center for the state. The important manufacturing establishments include medicine works, garment factories, a large packing house, typewriter works and various other factories producing starch, flour, wagons, scales, furnaces, engines, soap, cigars, electrical appliances and numerous other articles. An army post known as Fort Des Moines is located just outside the city limits. The town of Fort Des Moines was platted in August, 1846. A new charter was adopted in 1852 and the prefix *Fort* was dropped from the name of the city. On February 16, 1857, the capital was moved to Des Moines. Population in 1910, 86,368.

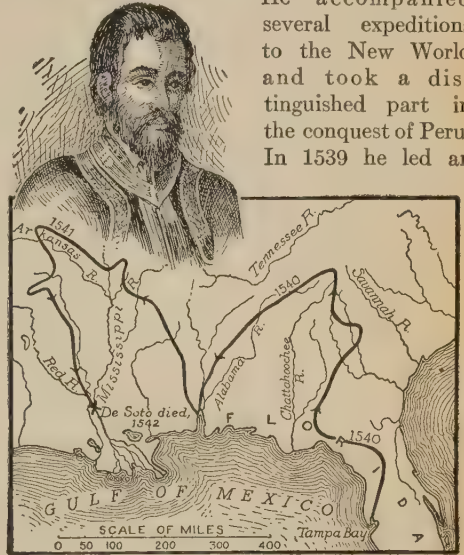
Des Moines River, an important river in Iowa, formed by the meeting of two streams in Humboldt co. Iowa. It flows south-southeast through Iowa, through a rich agricultural region, to a point about four miles below Keokuk and then empties into the Mississippi River. The affluents are the Raccoon, North, Middle, South and Boone rivers. Its length is estimated at 500 miles, and it drains an area of over 14,000 square miles. Des Moines, Fort Dodge and Ottumwa are the principal cities on its banks.

De So'to, Mo., a city in Jefferson co., 43 mi. s. w. of Saint Louis, on the Saint Louis, Iron Mountain & Southern railroad. It is in

Detroit

a lead and zinc mining region, contains railroad machine shops, flour and planing mills and also exports grain, produce and live stock. Population in 1910, 4721.

De Soto, FERNANDO (1496-1542), a Spanish explorer, the discoverer of the Mississippi. He accompanied several expeditions to the New World and took a distinguished part in the conquest of Peru. In 1539 he led an



FERNANDO DE SOTO AND MAP OF HIS JOURNEYING

expedition to Florida, whence, after many difficulties, he penetrated beyond the Mississippi, but was attacked with fever, died and was buried in the depths of the river. The rest of his party, scarcely one-quarter of the original number, found refuge in the coast settlements of Mexico.

Dessau, des'sow, a town in Germany, capital of the duchy of Anhalt, in a beautiful valley on the left bank of the Mulde, about 80 mi. s. w. of Berlin. It is mostly well built, with fine squares and many handsome buildings, among which is a fine grand-ducal palace containing works of the early German masters, interesting relics and antiquities. It was at the bridge of Dessau that Wallenstein won his victory over Count Mansfeld in the Thirty Years' War in 1626. Population in 1910, 56,605.

Detroit, MICH., the county-seat of Wayne co., chief city of the state, port of entry and ninth city in population in the United States, is situated on Lake Saint Clair, the Detroit River and the River Rouge, 285 mi. e. of Chicago, 251 mi. w. of Buffalo and 18 mi. from Lake Erie. It is on the Michigan Central, the Grand Trunk, the Pere Marquette, the Wabash and

the Lake Shore & Michigan Southern railroads, and is a terminal point of the Canadian Pacific, the Detroit and Toledo Short Line and the Detroit, Toledo & Ironton railroads. The city extends along the river for 11 miles, having an area of over 41 square miles, and has an extensive lake traffic in both passengers and freight. It is a port of call for lines of passenger steamers traversing lakes Huron, Michigan and Superior, and there are other lines whose boats ply regularly between this city and Toledo, Cleveland, Buffalo, Port Huron and other lake ports during the months open to navigation. Detroit is built on land that rises slightly from the river. The city is regularly laid out, one set of streets running parallel with the river, and another set crossing them at right angles. In the central and older portions of the city, however, the streets radiate from a semi-circular plot known as the Grand Circus Park, and from a second central point called the Campus Martius, and near these the blocks are somewhat irregular, a number of them being triangular. Running from the central portion of the city are three avenues which cut the other streets diagonally; these are Gratiot Avenue, Grand River Avenue and Michigan Avenue. Woodward Avenue, which divides the city into two nearly equal parts, is an important street. In the downtown district it is devoted to business purposes, but after leaving this district, it is largely a street of churches, temples, club houses and garages. Jefferson Avenue, which runs parallel with the river, is another important business and residence street.

Detroit has 31 parks and nearly 15 miles of boulevards. The largest and most noted park is Belle Isle, which includes the entire island of this name in the Detroit River, and has an area of 704 acres. It is laid out with beautiful walks, drives, flower gardens and lagoons, and contains quite a complete zoological collection, including a fine aquarium. It also has a commodious and admirably planned bathing beach. The island is connected with the city by a magnificent bridge, built at a cost of \$300,000. Grand Circus, from its location, is an important park, though it contains but 5½ acres. Situated as it is in the center of the business district, it affords excellent opportunity for rest. It is divided into two equal parts by Woodward Avenue. Palmer, Clark, Owen and Cass parks and the water works grounds are also worthy of mention. Besides these there are numerous interesting and beautiful places along the river, which during

the summer are reached by excursion steamers that ply regularly between them and the city. Elmwood and Mount Elliot cemeteries in the eastern part of the city are noted for their drives and monuments. Other cemeteries noted for their beauty are Woodmere, Woodlawn and Mount Olivet. The Grand Boulevard is a beautiful street and parkway combined, 150 feet wide and about 11½ miles long. It encircles the business portion of the city and is one of the thoroughfares frequented by visitors and tourists. The most important of the public buildings are the city hall, located in City Hall Square; the Federal building and the county building. The largest office buildings are the Dime Savings Bank, Ford, Penobscot, Kresge, Chamber of Commerce and Majestic; the largest hotels are the Pontchartrain and the Cadillac. Another noteworthy building is the new Michigan Central station, built at a cost of \$2,000,000. Facing the city hall is the Soldiers' and Sailors' Monument, consisting of a granite shaft, 55 feet high, surmounted by a colossal bronze statue representing Michigan. Among the churches worthy of mention are the Saint Paul's Episcopal Cathedral, Saint Hedwig's, Saint Leo's and Saint Joseph's Catholic churches, the Central Methodist, the First and Fort Street Presbyterian, the Woodward Avenue Baptist, the First Congregational and the Jewish Temple, Beth-El.

Among the educational and charitable institutions worthy of mention are the public library, having about 310,000 volumes; eleven branches of the public library; the Museum of Art; the Young Men's and Young Women's Christian Associations; the Detroit College; the Detroit College of Medicine and the Detroit College of Law. The most noted hospitals are the City General, Grace and Harper, the latter two maintaining training schools for nurses. There are also separate city hospitals for contagious diseases and a tuberculosis hospital.

Detroit is one of the most important commercial centers on the Great Lakes, since it is a convenient port for all passing steamers. The river is lined with piers and is of such depth as to admit the largest boats. The city is also an important railway center, and on the opposite bank of the river is Windsor, the meeting point of a number of Canadian railways. A tubular two-track tunnel gives passage for railway trains under the river, and railway ferries of large capacity also carry trains across.

The leading industries include the manu-

Detroit River

facture of stoves and other foundry and machine shop products, the manufacture of automobiles and adding machines, in which Detroit leads the world, iron and steel, freight cars, tobacco products, chemicals and drugs, furniture, carriages and lumber. There are also slaughtering and meat packing establishments, and the city contains large paint and varnish works. The city has extensive dry docks, and near by are two of the largest shipyards on the Great Lakes.

HISTORY. The first settlement was made by the French under Cadillac in 1701, and was a fortified trading post. In 1763, at the close of the French and Indian War, the place was besieged by the Indians under Pontiac for several months, but was saved by the heroism of its defenders. During the Revolutionary War it was the headquarters for the British forces in the Northwest and the point from which numerous expeditions were sent out against the American settlers on the frontier. It was captured by the British in the War of 1812, but was regained by the Americans the following year. The city was incorporated in 1824 and was for a time the capital of Michigan Territory and of the state. It was supplanted by Lansing in 1847. Population in 1910, 465,766.

Detroit River, a river which runs from Lake Saint Clair to Lake Erie. It is named from the French word meaning *strait*. Its length is 28 miles, and its width is from one-half to 3 miles. The depth is sufficient for the navigation of the largest vessels. It is a great waterway, with the Saint Clair lake and river, and it is estimated that more tonnage of shipping passes through this river than through any other in the world. The river is studded with islands, and the scenery is very beautiful. The map accompanying the article DETROIT shows the river and its connections.

Deuca'lion, in classic mythology, the son of Prometheus. When, on account of the wickedness of mankind, Jupiter decided to destroy the world, Deucalion and Pyrrha, his wife, were spared because they had always been virtuous servants of the gods. When, after the deluge had subsided, Deucalion and Pyrrha came down from Mount Parnassus, they found the earth depopulated, and on seeking of the oracle at Delphi information as to how they could repopulate the earth, they received the response that they were to throw behind them the bones of their mother. As this, literally translated, would have been a sacrilege, which they knew the gods would not have commanded,

Deviation of the Compass

Deucalion and Pyrrha decided that it referred to their mother earth. Accordingly, they threw over their shoulders stones, which on striking the earth became human beings.

Deu'teron'omy, the fifth book of the Bible and the last of the Pentateuch. It contains the last injunctions of Moses and an account of his death and is practically a review of the law, which was given to the Israelites on Sinai, with the additions that had been made from time to time until just before the death of Moses. The book consists of three orations, each of which deals with a specific phase of the law, and closes with an account of the author's death. It is notable for the beauty of its language and the comprehensive view of the Jewish law which it contains. It is supposed that a portion of this book was the book discovered during the reign of Josiah, and because of this it was known thereafter as the Book of the Law. A thorough understanding of it involves the reading of *Exodus*, *Leviticus* and *Numbers*.

Dev'ens, CHARLES (1820-1891) an American jurist and soldier, born in Charleston, Mass. He graduated at Harvard in 1838, became a lawyer, and after serving for a term in the United States Senate was made United States marshal for Massachusetts. From 1861 to 1866 he served in the Union army and he was brevetted major general after the capture of Richmond. In 1867 he became a superior court justice in Massachusetts and in 1873 justice of the state supreme court. In 1877 he became attorney-general of the United States, and four years later he was again made a supreme court justice of Massachusetts.

De'via'tion of the Compass, the variation of a ship's compass from the true magnetic meridian, caused by the near presence of iron. When ships were built of wood, there was so little deviation that it might with safety be disregarded; but after more iron was introduced into the construction of the ships, the deviation became sensible, and now in the iron ships of the present day it is a phenomenon that must be taken into account in all cases. Whenever a ship is constructed, the action of the compass on it is carefully tested and a table of its deviations is recorded, so that the navigator may never be in doubt as to the direction in which he is steering. To lessen the deviation as much as possible, the compass is placed some distance from the deck and is surrounded by a box that tends to lessen the attraction of the ship.

Dev'il, in theology, an evil spirit or being; specifically, the evil one, represented in Scripture as the traducer and the father of lies. Most of the old religions of the East acknowledge a host of devils. The doctrine of Zoroaster, who adopted an evil principle called Ahriman, opposed to the good principle and served by several orders of inferior spirits, spread the belief in such spirits among the people. The Greek mythology did not distinguish with the same precision between good and bad spirits. With the Mohammedans Eblis, or the devil, was an archangel whom God employed to destroy a pre-Adamite race of *jinn*s, or genii, and who was so filled with pride at his victory that he refused to obey God. The Satan of the New Testament is also a rebel against God. He uses his intellect to entangle men in sin and to obtain power over them and is a creature subject to omnipotent control, not an independent, self-existent principle, like the evil principle of Zoroaster. The doctrine of Scripture on this subject soon became blended with numerous fictions of human imagination, with the various superstitions of different countries and with the mythology of the pagans. The excited imaginations of hermits in their lonely retreats, sunk as they were in ignorance and unable to account for natural appearances, frequently led them to suppose Satan visibly present; and innumerable stories were told of his appearance and his attributes of the horns, the tail and the cloven foot. In consequence of the cures which Christ and his apostles performed on the possessed, the early church believed the consecration of priests gave the power to drive out evil spirits. The belief in evil spirits and witches was in the seventeenth century so common that they became the objects of judicial process. With the progress of the natural sciences, however, in the eighteenth century, many wonderful phenomena became explained, and less was heard of witchcraft. See WITCHCRAFT.

Devil Fish, the popular name of various fishes, one of them being the angler. In the United States the name is given to several large species of the ray or skate, common on the Atlantic and Pacific coasts and much dreaded by divers, whom they are said to devour after enveloping them in their vast wings. On the Pacific coast the name is given to the California gray whale.

Devil Worship, the worship paid to the devil, an evil spirit, a malignant deity or the

personified evil principle in nature, by many of the primitive tribes of Asia, Africa and America, under the assumption that the good deity does not trouble himself about the world; or that the powers of evil are as mighty as the powers of good, and must in consequence be bribed and reconciled. There is a sect called devil-worshippers inhabiting Turkish and Russian Armenia and the valley of the Tigris, who pay respect to the devil, to Christ and to Allah, or the supreme being, and also worship the sun.

Devon'ian Period, a division of the Paleozoic era, between the Silurian and the Carboniferous periods, named from Devon, England. During this period the Continent of North America was represented by two land masses, the Appalachian and the Continental. The first extended as far south as Georgia and as far west as the Blue Ridge Mountains, while the eastern boundary was probably farther east than the Atlantic shore line. The Continental mass extended westward from the Hudson River, the shore-line forming a great bay which covered the territory now occupied by western New York, Michigan and a part of Ontario. There were detached portions of land also in Colorado, the region of the Black Hills in South Dakota and the central part of Texas, and a long, narrow strip bordered what is now the great basin of Nevada and Utah. In the Old World most of Russia and Siberia were under water. The animal life included crustaceans similar to the horseshoe crab and lobster, crinoids, starfishes and various forms of mollusks; but the most characteristic life of the period was that of the fishes, which reached their highest development, and because of this, this period has been by some geologists named the *Age of Fishes*. See DEVONIAN SYSTEM; CARBONIFEROUS SYSTEM; SILURIAN SYSTEM.

Devonian System, in geology, a name originally given to rocks of Devonshire and Cornwall, intermediate between the Silurian and Carboniferous strata, and consisting of sandstones of different colors, calcareous slates and lime-stones. The formations are divided into lower, middle and upper groups. All contain fossils, but the middle most abounds in them, including corals, crinoids, crustaceans, mollusca and cephalopods. But these were all outnumbered by the fishes, which at this time reached their greatest development. Devonian rocks occupy a large area in central Europe, as well as in the United States, eastern Canada and Nova Scotia. The term has been often used as equivalent to

Devonshire

Old Red Sandstone. See CARBONIFEROUS SYSTEM; SILURIAN SYSTEM.

Devonshire, *dev'on shir*, SPENCER COMPTON CAVENDISH, Eighth Duke of (1833–1908), a British statesman. He was successively lord of the admiralty, secretary of war and post-master-general, before his appointment in 1871 as chief secretary for Ireland. In 1880 he was asked to assume the premiership, but he refused and served as secretary of state for India, and later as secretary of state for war, in the cabinet formed by Gladstone. When the Liberal Unionists separated from Gladstone's party on the Home Rule question in 1886, the duke of Devonshire became the leader of the new party. From 1895 to 1903 he served as president of the council, and in 1900 he was made president of the board of education.

Dew, moisture from the atmosphere that gathers on cool bodies, particularly at night. During the day the earth both absorbs and gives off heat, but after sunset its supply of warmth is cut off, while it still continues to radiate heat into the surrounding space. Grass, flowers and foliage, being good radiators, lose after sunset the heat which has previously been absorbed by them, without receiving any in return, and their temperature consequently falls considerably below that of the atmosphere. This lower temperature causes these objects to condense the vapor in the atmosphere surrounding them, and it is deposited upon their surfaces in the form of dew, or of hoarfrost, where the temperature of the atmosphere is below 32°.

When the sky is clouded, the heat abstracted from the earth's surface by radiation is restored by the clouds, which, being good radiators, send back an amount of heat equal to what they receive; and a balance of temperature being thus maintained between the earth and the surrounding atmosphere, no dew is formed. The formation of dew is likewise prevented by wind, which carries away the particles of air before the vapor contained in them has been condensed. Horizontal surfaces and those which are exposed to a wide expanse of sky receive a greater supply of dew than sheltered or oblique surfaces, where circumstances diminish the amount of radiation. The heavy dews which fall in tropical regions are in the highest degree beneficial to vegetation, which, but for this supply of moisture, would, in countries where scarcely any rain falls for months, be soon scorched and withered. But after the high temperature of the day, the ground

Dewey

radiates under these clear skies with great rapidity, the surface is quickly cooled, and the water vapor, which from the great daily evaporation, exists in large quantities in the atmosphere, is deposited abundantly. This deposition is more plentiful, also, on plants, from their greater radiating power; while on hard, bare ground and stones, where it is less needed, it is comparatively trifling. In cold climates the earth, being cold and sufficiently moist, requires little dew; accordingly, the clouds, which are common in damp and chilly regions, prevent the radiation of heat, and the deposition of dew is slight. See FROST.

Dew'ey, GEORGE (1837–), an American naval officer, born in Montpelier, Vt. He graduated from the United States Naval Acad-



GEORGE DEWEY

emy in 1858 and entered the service of the United States aboard the frigate *Wabash*. In 1861 he was commissioned lieutenant and assigned to the steam sloop *Mississippi*, under Farragut. He took part in forcing the defenses of New Orleans and later lost his vessel by running her aground in a fog. In 1870 he was put in command of the *Narragansett* and made surveys on the Pacific coast for six years, and some years later he was put in command of the *Juniata*, on the Atlantic station. He next commanded the *Dolphin*, and later still the *Pensacola*, and

in 1896 he was promoted to the rank of commodore. When war broke out with Spain, he was placed in command of the Asiatic squadron, and he won the Battle of Manila Bay, May 1, 1898, without the loss of a man from his fleet. For this he was made a rear admiral and was given the thanks of Congress. The next year he was created admiral of the navy by special act of Congress. He returned to the United States in September and received an unprecedented popular welcome. When the Schley court of inquiry was instituted he was made its president and upheld Schley in some actions for which the court as a whole censured him.

Dewey, JOHN (1859–), an American educator and psychologist, born at Burlington, Vermont. He was educated in the University of Vermont and filled successively the positions of professor of psychology in the University of Minnesota and the University of Michigan and professor of philosophy in the University of Chicago. He organized the laboratory, or practice, department of the School of Education at the latter institution, and it is called for him the Dewey School. In 1904 he was chosen head of the department of philosophy in Columbia University. Professor Dewey has become widely known through his writings and lectures. The best known of his publications are *Psychology*; *Leibnitz's Essays Concerning the Human Understanding*; *The Critical Theory of Ethics*; *Study of Ethics*; *Psychology of Number*, and *School and Society*.

Dewey, MELVIL (1851–), an American librarian and educator, born at Adams Center, N. Y., and educated at Amherst College. He early became interested in library work and was the leader in the movement to found the American Library Association. He was the founder, and for five years the editor, of the *Library Journal*. Later he was chosen librarian of Columbia University, where he established the School of Library Economy and became its director. From this position he was chosen secretary of the University of the State of New York and director of the state library. He transferred the library school to Albany, where it has since remained. Doctor Dewey is considered the leading authority on libraries in the United States. He originated the decimal system of classifying books, and was one of the prime movers in the work of university extension and in establishing traveling libraries.

De Witt', JAN (1625–1672), a Dutch statesman. He inherited from his father a hatred of

the Prince of Orange and his policy. He was made grand pensionary of Holland and in this office labored to lessen the power of the House of Orange and abolish the office of stadtholder. In 1665 war with England was begun and conducted by De Witt with great ability till its termination in 1667. In 1672 Louis XIV invaded the Spanish Netherlands and involved Holland in war. De Witt's popularity, already on the decline, suffered still further in the troubles thus occasioned, and he felt it necessary to resign his office of grand pensionary. He was murdered in the same year.

Dex'trin, a soluble or gummy substance, into which starch can be converted by the action of dilute acids, by malt extract or by heat. By the action of hot diluted acid, dextrin is finally converted into grape sugar. It is white, insipid and without smell. It is a good substitute for gum arabic for stiffening goods and in calico printing. It is also used on the backs of postage stamps.

Dhawalagiri, *dah hwah lah ge're*, one of the highest peaks of the Himalayas, in Nepal. Its height is 26,826 feet.

Di'abase, a variety of crystalline, igneous rock composed of lime-soda, feldspar and pyroxene. The feldspar forms in long, flat crystals that usually radiate in all directions. When the grains of pyroxene are also large, a striking mottled effect is produced. Diabase is a variety of trap and is closely related to basalt. In general appearance the massive variety is hard, heavy and compact. It is found in dikes or intrusive sheets, disintegrates into irregular or spherical boulders and forms deep, red soil. Diabase containing olivine is of a green color. The pyroxene may be displaced by hornblende, and both the pyroxene and olivine, by serpentine. Among the most important formations of diabase in the United States are the copper-bearing rocks of Keweenaw Peninsula, Lake Superior; the Palisades on the Hudson and the Hanging Hills near Meriden, Conn. It also occurs in large formations in Scandinavia and southern India. See **BASALT**; **DIKE**.

Diagonal Scale, a scale which consists of a set of parallel lines drawn on a ruler, with lines crossing them at right angles and at equal distances. One of these equal divisions, namely, that at the extremity of the ruler, is subdivided into a number of equal parts, and lines are drawn through the points of division obliquely across the parallels. With the help of the com-

passes such a scale facilitates the laying down of lines of any required length to the 200th part of an inch.

Di'al. See **SUNDIAL**.

Di'alect, forms of a language differing in grammar, vocabulary or pronunciation from the language as it has been adopted in literature and in intercourse among well-educated people. Although the use of provincial dialects becomes inconvenient after a language has acquired a fixed literary standard, the study of such dialects is always valuable to the philologist for the light it throws on the history of the language. Dialects at one time differed so in England that inhabitants of one county could scarcely understand those of an adjoining one. Education and printed books have much relaxed the hold which the provincial dialects of various countries once had on the people, and in general it may be said that the educated classes of any country now speak a uniform language.

Dialec'tic, the old name of logic, or the art of reasoning. Hegel applied the term to the evolution of all truth, which he declared passed through three stages: The primary proposition as originally stated; the opposed proposition, and the reconstruction of these two on a higher plane of reasoning, which discloses the unity underlying the opposing extremes.

Di'amond, the hardest and one of the most valuable of gems, the purest form in which the element carbon is found. It crystallizes in forms belonging to the regular, or cubic, system, the most common being the regular octahedron and the rhombic dodecahedron (twelve faces). The finest diamonds are colorless, perfectly clear and transparent. Such are said to be of the first *water*. But diamonds are often blue; pink, green or yellow, and such are highly prized, if of a decided and equal tint throughout. The diamond is so very hard that nothing will scratch it—it is, in fact, the hardest substance known. The value of a diamond is much enhanced by the cutting of facets upon it, inclined at certain angles to one another, so as to produce the greatest possible play of color and luster. What is called the *brilliant* cut best brings out the beauty of the stone. Its upper or principal face is octagonal, surrounded by many facets. But this form of cutting requires an originally well-shaped stone. For other diamonds the *rose* cut is used. In this form six triangles are cut on top so that their apices meet in a point called the summit. Round this are disposed other facets. Stones which are too thin to cut

as rose diamonds are cut as *table* diamonds, which have a very slight play of color. The art of cutting and polishing the diamond was unknown in Europe till the fifteenth century, and the stone itself was not nearly so highly valued in the Middle Ages as the ruby.

The uncut diamond looks like a piece of quartz. It is of a dull white color and is full of rough seams. In this condition it is set into a matrix of wax, which is fastened to the end of a stick. The wax becomes very hard when cooled. In another matrix a cheap diamond is set, and a workman grinds the two stones together, until the one to be cut has assumed the general form of a brilliant. The dust and chips which come off are carefully collected and used afterward in polishing work. The rough stone is then firmly fixed in a matrix of metal, composed of zinc and lead, and set into a cup-shaped instrument of iron. The workman is then ready to begin cutting. In this process an iron disk turning at the rate of 2000 revolutions a minute is used. Upon the disk is sprinkled a supply of diamond dust, which sinks into the minute pores of the iron and produces the sharpest grindstone that can be made. The workman, with a magnifying glass close to his eye, grinds first the table, or top part, of the brilliant. This completed, the metal matrix is melted from the stone, which is put in, face downward, so that the exact opposite of the stone will be ground. After this, one by one, the facets, or bezils, are cut, the first two opposite and parallel, and the second two at right angles to the first two. If the diamond is large, the corners remaining between the four opposite cuts are also beveled. Then the stone is turned over in its matrix, and the facets between the girdle and the point known as the *collet* are cut in the same way. Rubies and sapphires are cut by the same general process. Moss agate, topaz, agate, amethysts and other half-precious stones are first sawed into proper sizes with a soft tin wheel. When the agate, for instance, has been sawed to the proper shape, it is smoothed down on an ordinary grindstone and is then taken in hand by the polisher, who applies it to a fine grindstone, and, after being ground for about an hour, it is ready for the market.

Diamonds are valuable for many purposes. Their powder is the best for the lapidary. They are also used for jewels in watches, as lenses for microscopes, and in the cutting of window and plate glass. When used as a glazier's tool the diamond must be uncut. Inferior kinds of

diamonds are also extensively used by engineers in rock boring and by copperplate engravers as etching points. Diamonds are obtained from alluvial deposits, such as sands and clays, from which they are separated by washing. They are found in India, Borneo and other parts of the East, and in some localities in North America and Australia; but the chief diamond fields of to-day are Brazil and Cape Colony, the center of the latter being Kimberley, in Griqualand West, where diamonds were discovered in 1867. These mines now yield more than nine-tenths of all the diamonds produced in the world.

One of the largest diamonds known (weight 367 carats) was found in Borneo about a century ago, and it now belongs to the rajah of Mattan. One of the most celebrated is the Koh-i-noor (Mountain of Light), belonging to the British crown. It weighed originally nearly 800 carats, but by subsequent recuttings it has been reduced to 103 $\frac{3}{4}$ carats. The Orloff diamond, belonging to the emperor of Russia, weighs 195 carats; the Pitt diamond, among the French crown jewels, weighs 136 $\frac{1}{2}$ carats. The former, which came from India, has been thought to have originally formed part of the Koh-i-noor stone. Some of the South African diamonds are also very large, one of them of inferior color weighing 428 carats. In 1905 the largest diamond yet discovered was found in the Premier mine in Transvaal Colony. It weighed in the rough about 3000 carats, and was cut into nine large stones and a number of small ones. It was known as the Cullinan diamond.

Dian'a, in classical mythology, the goddess of the moon and of the chase, known to the Greeks as Artemis. She was the daughter of Jupiter and Latona and the twin sister of Apollo, born on the island of Delos. She was a maiden divinity, but that she was not entirely exempt from the power of love is shown by her treatment of Endymion (See **ENDYMION**). The strictest chastity was demanded of her worshippers, and at one time she changed Actaeon into a stag and allowed him to be torn to pieces by his dogs, because he had come upon her as she was bathing. As the goddess who presided over births, she was especially worshiped by women, and no man was allowed in her temple. In accordance with her various characters, there were differing representations of her. Most frequent are those as a huntress, with bow and arrows; as a moon goddess, with the crescent of the moon above her forehead,

or as the goddess of the nymphs, in a chariot drawn by stags.



DIANA—Correggio

Diaphragm, *di'a fram*, in anatomy, the principal muscle of respiration, completely separating the cavity of the chest from that of the abdomen. The aorta, esophagus, thoracic duct, inferior vena cava and some of the large nerves pass through it. In its natural situation the diaphragm is convex on the upper side and concave on its lower, but when the lungs are filled with air it becomes almost flat, pressing the contents of the abdomen downward and outward. It is the principal agent in respiration, particularly in inspiration. A complete diaphragm is found only in Mammalia. See **HICCOUGH**; **RESPIRATION**.

Dias, *de'as*, **BARTHOLOMEU** (?-1500), a celebrated Portuguese navigator. He was put in charge of an expedition to explore the west coast of Africa, and without knowing it he sailed around the southern end of the continent and found himself, to his surprise, on the east coast. The southernmost cape of the continent the Portuguese king named the Cape of Good Hope. On his return from a voyage to Brazil in 1500, Dias perished in a storm.

Di'atom, a suborder of minute plants, singly invisible to the naked eye, but almost univer-

Diaz

sally distributed throughout both salt and fresh water. They are found in rain troughs, in ditches, on sand at the bottom of clear brooks, on snow and even in the dust of volcanoes. Countless millions of them exist in the water, where they form a large portion of the food of the lower marine animals. Under the microscope they are found to have hard coverings, or shells, which are exquisitely sculptured and exist in a great variety of beautiful forms.

Diaz, de'as, PORFIRIO (1830—), a Mexican soldier and statesman. For a time he studied



PORFIRIO DIAZ

law, but at the outbreak of the war with the United States he entered the army, and from that time he devoted himself to a military career. In the factional fights which disturbed Mexico for many years he took a prominent part, identifying himself with the Liberal party and proving, during Napoleon III's attempt to found an empire under French control, a most efficient leader of the patriots. In 1867 he marched to Puebla at the head of a Republican army and took the city by storm, and afterward he aided in the capture of the City of Mexico. In 1876 he became president, and he soon proved his exceptional ability. During his term the tariff was revised, finances were improved and important lines of railway were established. He was succeeded by General Gonzalez and became minister of public works, but in 1884 he was again elected president, and changes were made in the constitution so that he might

Dickens

continue in office. Until 1911 the opposition to Diaz was not powerful enough to accomplish his overthrow, but in that year a revolution headed by General Madero resulted in the resignation of the president and his enforced departure from the country. He took up his residence in Spain.

Dice, dise, cubical pieces of bone or ivory, marked on each of their six faces with dots, from one to six in number. The dice are shaken in a small box and are then thrown on the table, when the throw is counted in various ways, usually like the cards in a poker hand. The dice of gamblers are often loaded or falsified in some way, so as to make the high or the low sides turn down. Dice are of very ancient origin, being well known among the Egyptians and Greeks.

Dickcis'sel, a handsome bird, rather larger than the majority of the sparrow family, to which it belongs, and common in the open regions of the central United States. Its back and body generally are dark, though there is a bright chestnut patch on the wing. Its throat is white; its lower parts are yellow, with a black crescent band across the breast.

Dick'ens, CHARLES (1812-1870), one of the great English novelists of the Victorian Age,



CHARLES DICKENS

born at Landport, Portsmouth. He received a scanty education, was for a time a mere drudge in a blacking warehouse and subsequently became clerk in an attorney's office. Having made

himself acquainted with shorthand, however, he became a newspaper critic and reporter, and later he was a contributor to the *Monthly Magazine* and the *Evening Chronicle*, in which were published the essays and tales known as *Sketches by Boz*. These were so successful that a new series was begun, and in *Pickwick Papers* a new class of characters, eccentric, indeed, but vital representations of the humors and oddities of life, such as Mr. Pickwick, Sam Weller and his father, Mr. Winkle and others, were made familiar to the public.

To *Bentley's Magazine* Dickens contributed *Oliver Twist*, a work which opened up that vein of satire of institutions which became a distinguishing feature of his work. As the special object of *Oliver Twist* was to expose the abuses of the workhouse system, so that of *Nicholas Nickleby* was to denounce the management of cheap boarding schools. Both did, indeed, do much toward correcting the abuses against which they were directed. *Master Humphrey's Clock*, issued in weekly numbers, contained among other matter the *Old Curiosity Shop* and *Barnaby Rudge*, the latter an historical tale. On his return from a visit to America, Dickens wrote *American Notes for General*



GADSHILL, DICKENS' HOME

Circulation and *Martin Chuzzlewit*, which dealt with his American experiences, and which contained more of his characteristic humor than any of his other works, except *Pickwick Papers*.

In 1845 Dickens went to Italy, and on his return the *Daily News* was entrusted to his editorial management; but this was an occupation uncongenial to his mind, and in a few months the experiment was given up. The *Pictures from Italy* were published the same year. Next followed *Dombey and Son* and *David Copperfield*, a work which has a strong autobiographical element, and which was Dickens's favorite among his works. In 1850

Dickens became editor of the weekly serial, *Household Words*, which was converted later into *All the Year Around*. In 1853 appeared *Bleak House*, an appeal against interminable suits in chancery, and this was followed by a *Child's History of England*; *Hard Times*; *Little Dorritt*; *A Tale of Two Cities*, the second of his novels with an historical setting; *Great Expectations*, the best-rounded of his works, and *Our Mutual Friend*, the last novel which he lived to finish. *The Mystery of Edwin Drood* was left incomplete at his death. During his latter years, Dickens increased his popularity by giving readings from his own writings.

In reading any of Dickens's novels, and more especially those that contain most of his peculiar wit and humor, one is impressed with the fact that he must have been a delightful companion. His humor lies so largely in the way he looked at things, the ability to put into words the incongruities which another observer might easily miss, that one feels that a walk about London with him would have afforded more amusement than the best passages of his works; and the testimony of Dickens's friends convinces us that he was in his everyday life the genial, interested man which one might expect to find him. He was of a very sociable temperament and delighted in having his friends about him. One of his most marked characteristics was the dramatic ability mentioned above and his extreme fondness for the theater. He often took part in private theatricals, and it is said that at one time an old banner-bearer at one of the theaters said to him, "Ah, Mr. Dickens, if it hadn't been for them books, what an actor you would have made!" This statement was not at all exaggerated.

The rank to which Dickens is entitled among novelists has been a question much debated. That his ability to grasp at once the most striking characteristics of a person, and his eagerness to make all men see as he saw, frequently led him into exaggeration, is true and gives ground to the charge that his characters are often caricatures. But his humor, his power of observation and his genuine love for men must be admitted, as must also the fact that many of his characters—Mr. Micawber, Sam Weller and Mrs. Gamp, for example—whether caricatures or not, fully justify their creation by the unflinching amusement which they afford. See Forster's *Life of Dickens*.

Dickinson, ANNA ELIZABETH (1842-); an American author and lecturer, born in

Philadelphia. In 1857 she made her first venture as a speaker before the members of a society of "Progressive Friends," who were interested in the antislavery movement. In 1859 she taught school and in 1861, for about nine months, was employed at the United States mint in Philadelphia. After that time she lectured much on temperance, abolition and woman suffrage. After the close of the war she appeared mostly as a lecturer before literary societies. In 1876 she attempted to begin a theatrical career, but this venture was unsuccessful. Among her works are the plays, *A Crown of Thorns and True to Herself*; a novel, *What Answer?*, and *A Ragged Register of People, Places and Opinions*.

Dickinson, DONALD McDONALD (better known as Don M.) (1846-), an American lawyer and politician, born at Port Ontario, Oswego, N. Y. He moved to Michigan in 1848 and graduated from the law department of the University of Michigan in 1866. He entered politics and became chairman of the Democratic state committee in 1876 and a member of the national committee in 1880. He was appointed by President Cleveland postmaster-general of the United States in 1887 and was chairman of the Democratic campaign committee in 1892. Dickinson was senior counsel for the United States before the Bering Sea Claims Commission.

Dickinson, JOHN (1732-1808), an American statesman and pamphleteer. He studied law in Philadelphia and at the Temple, London, and practiced his profession in Philadelphia. In 1763 he was elected to the assembly of Delaware, and later, of Pennsylvania. In 1767 he published his *Letters to the Inhabitants of the British Colonies, by a Pennsylvania Farmer*, showing that Parliament had no right to tax the colonies, but urging compromise and conciliation. They gave him a wide reputation on both sides of the Atlantic. As a member of the Continental Congress, he opposed the Declaration of Independence, believing that it was prematurely proclaimed, but he served in the army with credit. In 1779 he was elected to Congress from Delaware. In 1781 he became governor of Delaware and in 1782 was elected governor of Pennsylvania. Throughout the Revolutionary and following periods he wrote constantly on public questions, with great effect.

Dick'son, JAMES ROBERT, Sir (1832-1901), an Australian statesman, born at Plymouth, England, and educated in Glasgow. He removed to Australia in 1854 and entered

public life in 1872, when he was elected to the Queensland House of Assembly. He served successively as minister of public works, treasurer of the colony, secretary for railways and secretary for home affairs, before his appointment in 1898 to the office of premier. His great work, while in this position, was the passage of the measure which provided that the people should decide on the question of an Australian commonwealth. In 1900 he visited London in behalf of the proposed commonwealth. Ten days after the inauguration of the new government he died suddenly.

Di'cotyle'dons. See BOTANY.

Dicta'tor, a magistrate of the Roman Republic. The holder of this office possessed extraordinary powers and was appointed only in times of great emergency. The power of naming a dictator was vested, by a resolution of the Senate, in one of the consuls. The dictatorship was limited to six months, and the person who held it could not go out of Italy. He was also forbidden to appear in Rome on horseback without the permission of the people, and he had no control over the public funds without the permission of the Senate. He had the power of life and death and could punish without appeal to the Senate or people. All the other magistrates were under his orders.

Dictionary, *dik'shun a ry*, as ordinarily used, a book containing the words, or part of the words, of a language, arranged in alphabetical order, with explanations and definitions. In its wider sense, the term may be applied to a special work on one or more branches of science or art, prepared on the principle of alphabetical arrangement, such as dictionaries of biography, law, music, medicine and the like. The Assyrians, as early as the seventh century before Christ, had a dictionary of their language on clay tablets, in cuneiform characters, and the Arabians early showed that they recognized the need for such a work. These dictionaries, like those of the Greeks and Romans, were collections of rare words and meanings, rather than exhaustive collections of all the words in the language.

The first attempt to give a complete list of the words of the English language was made by Nathan Bailey (1721) in his *Universal Etymological English Dictionary*. The famous dictionary of Doctor Johnson, published in 1755, marked an epoch in the history of the English language. By this, too, was introduced the practice of illustrating the use of words by quotations from the best authors. The first great

American dictionary was published in 1828 by Noah Webster. This work has been frequently republished, and in subsequent editions has almost entirely altered its character. It is now known as *The International Dictionary* and is the standard authority in most of the states. The large American dictionary by Doctor Worcester has also made a good position for itself. Among other modern dictionaries of the English language, the most important are *The Standard Dictionary* and *The Century Dictionary*.

Didac'tic Poetry, that kind of poetry which professes to give a kind of systematized instruction on a definite subject or range of subjects. Thus the *Georgics* of Vergil and the *De Rerum Natura* of Lucretius profess to give, the one a complete account of agriculture and kindred arts, the other a philosophical explanation of the world. In a larger sense of the word, most great poems might be called didactic, since though without obvious aim at instruction, they contain a didactic element in the shape of history or moral teaching. Thus, Milton's *Paradise Lost*, Goethe's *Faust* and the dramas of Shakespeare all have ethical lessons, which are not, however, the sole, or even the chief, object of these works.

Diderot, *de dro'*, DENIS (1713-1784), a French writer and philosopher, born at Langres, in Champagne, and educated at the school of the Jesuits and afterward in Paris, at the College of Harcourt. His earliest works were pamphlets directed against the Christian religion, and one of them contained such open attacks on the existing ethical and social standards that it resulted in his imprisonment for some time at Vincennes. Diderot now tried writing for the stage, but his dramas were never successful. In 1749 he began, along with D'Alembert and some others, the *Encyclopaedia*, at first intended to be mainly a translation of one already published in English by Chambers. Diderot and D'Alembert, however, enlarged upon this project and made the new *Encyclopaedia* a magnificently comprehensive and bold account of all the thought and science of the time. During the time he was engaged on the *Encyclopaedia*, he wrote, besides his articles, several novels, none of which was published until after his death.

Di'do, daughter of a king of Tyre. After her father's death, his successor, Dido's brother Pygmalion, murdered her husband. Acerbas, or, as Vergil calls him, Sichaeus, for his wealth. Dido, however, managed to conceal this wealth,

and to escape with it to Africa, taking with her also many of the inhabitants of Tyre. Having obtained from the people of northern Africa a promise of as much land as she could cover with a bull's hide, she resorted to stratagem, cut the bull's hide into narrow strips, which she fastened together, and with this rope enclosed a large space of land, on which was built the citadel of Carthage. Vergil tells that Aeneas in his wanderings landed at Carthage and was entertained by Dido, who fell in love with him. When he was directed by the gods to depart, Dido in despair killed herself.

Didym'ium, a rare metallic element, which occurs, along with *lanthanum*, in the mineral cerite, was discovered by Mosander in 1843. Recent discoveries show it to consist of two elements, *praseodymium* and *neodymium*.

Die, a tool used for stamping metal. The die is made of the finest steel, and the design which it is to stamp is engraved upon it. Dies are used in stamping tools, coins and metals. They can be used by hand, but those used for stamping coins and medals are worked by machinery. In stamping coin, two dies are used, one above and one below, so that both faces are stamped at once.

Di'elec'tric, in general, an insulator or nonconductor of electricity. The term is especially applied to a nonconductor separating two conductors. See **INSULATOR**.

Dieppe, *dyep*, a seaport town of France, in the department Seine-Inférieure, on the English Channel, at the mouth of the Arques, 33 mi. n. of Rouen. Dieppe is one of the chief watering places of France. The manufactures include works in ivory, the most famed in Europe, works in horn and bone, lace-making, sugar-refining and shipbuilding. In early times Dieppe was the chief port of France, but its prosperity diminished after the revocation of the Edict of Nantes (1685). Population in 1911, 22,800.

Die-sink'ing, the art of preparing dies for stamping coins, buttons, medallions, jewelry and fittings. The steel for the manufacture of dies is carefully selected, forged at a high heat into the rough die, softened by careful annealing and then handed over to the engraver. After the engraver has worked out the design in intaglio the die is put through the operation of hardening, after which, being cleaned and polished it is called a *matrix*. This is not, however, generally employed in multiplying impressions, but is used for making a *punch*, or steel impression for relief. For this purpose another block of

steel of the same quality is selected, and after being carefully annealed or softened, it is compressed by proper machinery upon the matrix, till it receives the impression. When this process is complete, the impression is retouched by the engraver and is hardened and collared like the matrix. Any number of dies may now be made from this punch, by impressing upon it plugs of soft steel. In place of this process, patterns are now frequently engraved upon rollers, for transference to sheet metal by rolling pressure.

Diet, a meeting of a body of men, held for deliberation or other purposes; a term especially applied to the legislative or administrative assemblies of the German Empire, Austria and some other countries.

Diet, the food which is habitually eaten and drunk, to repair the waste of tissues and to support growth. The diet of persons varies much according to climate, work, age, sex, strength, state of health and individual taste. The daily quantity of the different food elements most desirable for a healthy man doing an average amount of work, is given in some diet scales as 4 ounces of proteids, 2 ounces of fats, 17 ounces of carbohydrates, 1 ounce of salt and 4 quarts of water; but this of course is subject to great variation. Slight changes are necessary for a change in climate. Hard work makes necessary an increase in all articles of diet. A diet composed largely of proteids will increase flesh. A diet of easily digested food is necessary for brain workers. The diet of a child should be different from that of a person in middle life, and that of an aged person is different from either, though it may be more nearly like that of a young child, for as activity diminishes the quantity of food should be decreased. Particular diets are necessary in certain diseases. In tuberculosis a person must eat all that he can digest of nitrogenous foods, bread with much butter, fats, olive oil, milk, cream, meats and eggs. Skim milk is valuable in diseases of the digestive organs. See **FOOD**; **DIGESTION**.

Dietetics, that part of medicine which relates to the regulation of diet. The ideal diet is clearly that which, without burdening the digestive organs uselessly, furnishes all necessary nutritive elements, with due consideration for the peculiarities of the person. No single substance contains the elements needed to replace the body's waste in their requisite proportions, and a mixed diet is therefore necessary. The nature of the food most suitable for a healthy man is

dependent in part upon general conditions, such as climate and season, and in part upon special conditions of individual habit.

Diffraction, in physics, the spreading of rays of light, so as to form a spectrum (See **LIGHT**, subhead *Spectrum*). If a round hole is made in a shutter to a dark room, and the rays of light thus admitted are allowed to fall upon a screen, an image of the sun is formed. If this hole be reduced to a very small opening, the image bears a fringe of rainbow colors, and if the hole is changed to a slit, a similar effect is produced. By coating a pane of glass with India ink, and then with a fine needle ruling parallel lines upon this surface, as near together as possible, a *diffraction screen* can be made, which will illustrate most of the phenomena of diffraction. Glass screens with very fine rulings are prepared by the most delicate machinery. for the purpose of illustrating these phenomena in physical laboratories. The play of colors seen on the feathers of some birds and in mother-of-pearl is due to diffraction.

Diffusion, the gradual and substantial mixing of the molecules of two fluids, when brought in contact. If a glass jar is filled with water that has been slightly colored with litmus, and then a few drops of sulphuric acid are placed in the bottom of the jar, through a small tube, the color of the water will gradually change. As fast as the acid comes in contact with the litmus solution, it changes the blue to red. If the vessel is allowed to remain quiet, the line of red slowly rises, until the blue has been entirely changed, showing that the acid has freely mixed with the water and changed the contents of the jar to a weak acid. Alcohol and water placed in a vessel will mix in a similar manner, but such liquids as oil and water or water and mercury, which have no adhesion between their molecules, will not mix. Gases diffuse in a similar manner. If two jars be placed with their mouths together, the lower filled with chlorine and the upper with hydrogen, in a short time the gases will be similar in both jars, though hydrogen is much the lighter gas.

Digester, a strong vessel of copper or iron, on which is screwed an air-tight cover, with a safety valve, the object being to prevent loss of heat by evaporation. Water may be thus heated to 400° F., at which temperature its solvent power is so greatly increased that bones are converted into a jelly. A common use of the digester is in the preparation of wood fiber for the manufacture of paper. See **PAPER**.

Digestion

Digestion, *di jes'chun*, the preparation of food for its absorption by the blood and lymphatic vessels begins in the mouth, where the saliva dissolves the salts and sugars taken in a solid form, and by its active principle, ptyalin, changes starch into sugar. In the stomach the salivary digestion may continue for some time, or till the presence of the free acid there stops the action of the ptyalin. The food, subjected in the stomach to a slight churning process, is mixed with the gastric juice, the active principle of which is pepsin. It digests albumens, changing them into soluble peptones. It does not affect the starches that have escaped the action of the ptyalin the sugars or the fats. Milk is curdled by the acid of gastric juice and by a ferment called *rennin*. The average time occupied in the digestion in the stomach is from three to four hours but the quantity and quality of the food, muscular exertion, bodily health and the condition of one's mind have a great influence on the time. When the *chyme*, the partly digested food, passes through the pylorus into the small intestine, the last stage of digestion begins. The pancreatic juice through its ferment, *trypsin*, finishes the work of the gastric juice in converting proteids into peptones. It completes the work of the saliva in converting starch into sugar, and the bile changes the fats and oils into a soapy substance. The intestinal juices complete the work, and *chyle*, the digested food, is ready for absorption. In the large intestine there is but little digestion carried on, though what has escaped the small intestine may be completed there. See ABSORPTION; CHYLE; FOOD; SALIVA.

Dighton, *di'ton*, **Rock**, a large boulder near Dighton, Mass., bearing an inscription which has been the object of much controversy among antiquarians. It was first believed to have been made by the Norse, but authorities now generally agree that it was written by Algonquian Indians.

Digit, *dij'it*, in arithmetic, any one of the ten numerals, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9. It is also a measure of a finger's breadth, equal to about three-quarters of an inch. Digit in anatomy is any one of the fingers and toes. In astronomy it is a unit of measure equal to one-twelfth the diameter of the sun or moon and used in estimating the quantity of an eclipse; that is, if the eclipse obscures one-half the diameter of the planet it is an eclipse of six digits.

Digitalis, *dij'i tal'is*. See FOXGLOVE.

Dijon, *de zhohN'*, a town in eastern France, capital of the department Côte d'Or, at the con-

Dilemma

fluence of the Ouche and Luzon rivers, about 150 mi. s. e. of Paris. It is beautifully situated and is surrounded by handsome parks. Among the interesting buildings are the cathedral, the palace of the dukes of Burgundy, used now as the townhall, and several churches. The industries include the manufacture of woollens, hosiery, candles, mustard, vinegar, chemicals and paper hangings, and there are, also, tanneries, foundries, machine factories, cotton mills and oil mills. Dijon dates from Roman times. The Burgundians possessed it in the fifth century, and later it was secured by the Franks. In the eleventh century it was part of the duchy of Burgundy, and in 1477 it was annexed to the crown of France. Population in 1911, 76,487.

Dike, in geology, the name of an elongated, narrow body of igneous rock that has been formed by molten rock being forced into fissures, where it solidified. Dikes vary from a few inches to a hundred feet or more in thickness. The rock in thin dikes is usually more compact, because of the quick cooling. The rocks disturbed may be sedimentary or igneous, and the dike is usually of a different degree of hardness from the rock upon either side. When harder, it forms ridges as the surrounding rock is worn away, and large dikes often cause great unevenness of surface. Dikes should be distinguished from veins which contain ore deposited from solution; but some dikes are formed from molten matter that contained vapor of water and some acids, as hydrochloric. Quartz porphyry and basalt are the most common dike rocks. Dikes are found in all regions that have been subjected to volcanic action. See DIABASE; ROCKS; VOLCANO.

Dilem'ma, in logic, an argument in which the same conclusion may be drawn from two contrary propositions. The following is one of the most famous of the classical dilemmas: A young rhetorician said to an old Sophist: "Instruct me in pleading, and I shall pay you when I gain a cause." The master sued for the reward, and the scholar eluded the claim by a dilemma. "If I gain my cause I shall not pay you, because the award of the judge will be against you. If I lose it I may withhold it, as I shall not have gained a cause." The master replied: "If you gain you must pay me, because you promised to pay me when you gained a cause; if you lose you must pay me, because the judge will award it." The two results which are found equally objectionable are called the *horns* of a dilemma.

Dilke, dillk, CHARLES WENTWORTH, Sir (1843-1911), an English politician and author. He studied at Cambridge and after his graduation traveled in the United States, Canada and the East. The result of these travels was a book entitled *Greater Britain: a Record of Travel in English-speaking Countries during 1866-67*. In 1868 he was elected to Parliament, and he served as under-secretary of state for foreign affairs and president of the local government board. The passage of the measure allowing municipal franchise to women was due largely to him.

Dil'lon, JOHN (1851-), an Irish politician. He was elected to Parliament for Tipperary in 1880, and his open expression of his radical views led to his imprisonment for several years. In 1885 he was elected to Parliament for East Mayo, and has been regularly reelected. From 1896 to 1899 he was the leader of the Irish nationalist party.

Dim'ity, a fine cotton fabric, with a ridged surface ornamented in the loom either by raised stripes or by fancy figures. White is a common color used, especially in bed covers and bedroom furniture.

Dinapur, de nah poor', a town in the Patna district, Bengal, British India, on the right bank of the Ganges, about 12 mi. n. w. of Patna. It is the cantonment and military headquarters of the district and has extensive barracks. There are handsome bungalows in the neighborhood. Population in 1911, about 40,000.

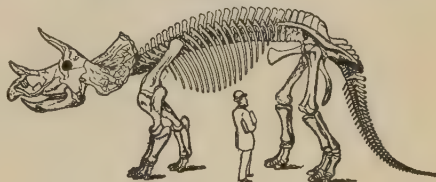
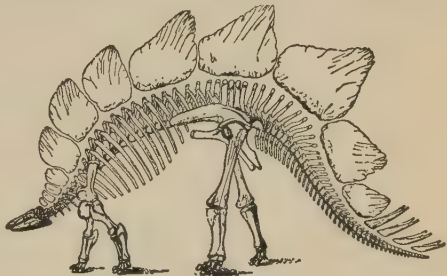
Ding'ley, NELSON, Jr. (1832-1899), an American journalist and legislator, born at Durham, Me., and educated at Dartmouth College. He became editor and proprietor of the *Lewiston Journal* in 1856; he was a member of the lower house of the Maine legislature for five terms, during two of which he was speaker, and was elected governor in 1874. In 1881 he was chosen to Congress and continued to be a member of the House of Representatives until his death. The tariff schedule of 1897, known as the "Dingley Tariff," was framed under his direction. At his death he was chairman of the ways and means committee.

Din'go, the native wild dog of Australia, extremely fierce and of a wolf-like appearance. It is remarkable for being the only dog existing both wild and domesticated. The natural cry of the dingo is a wolfish howl, but when kept with dogs it learns to bark. The ears are short and erect, the tail is rather bushy and the hair is of a tawny color. The dingo is very destructive to sheep and small domesticated animals.

Dinoceras, di nos'e ras, a fossil mammal, found in the Eocene strata of North America, in some respects akin to the elephant and of equal size, but without a proboscis.

Dinor'nis, an extinct genus of large wingless birds, classed with the ostrich family. The bones of five species have been found in New Zealand. The largest must have stood at least 14 feet in height. Several of its bones are at least twice the size of those of the ostrich.

Di'nosau'ria, a group of very large lizards intermediate between the ostrich-like birds and the lizards. The majority, as the *Megalosaurus*,



FOSSIL DINOSAURIA

which attained to 40 feet in length, were carnivorous; the *Iguanodon*, however, was herbivorous. They were the land reptiles of the Jurassic and Cretaceous periods. See *IGUANODON*.

Di'nothe'rium, a genus of extinct gigantic mammals, the remains of which occur in Tertiary formations in several parts of Europe. The *dinotherium* was related to the mastodon and the elephant, both of which it is supposed to have resembled, but no complete skeletons of the animal have been found.

Din'widdie, ROBERT (1690-1770), a colonial official in America, born in Scotland. He was governor of Virginia from 1752 to 1758, but was recalled, after precipitating the French and Indian War and, by his ill temper, avarice and incompetence, rendering himself generally unbearable to the Americans.

Di'ocle'tian, emperor of Rome, a man of low birth, who was raised to the imperial power by the army in 284 A. D. He appointed Maximian as his colleague, and chose two assistants, known as Caesars, who were to receive the

Diogenes

succession. Under these four the Romans won numerous victories. Diocletian and Maximian resigned the power to their subordinates in 305.

Diogenes, *di oj'e neez*, (412-323 B. C.), the most famous of the Cynic philosophers. Having been banished from his native place with his father, who had been accused of coining false money, he went to Athens and thrust himself upon Antisthenes as a disciple. He despised all philosophical speculations and opposed the corrupt morals of his time. Diogenes exposed the follies of his contemporaries with wit and good humor. As an exemplar of Cynic virtue he satisfied his appetite with the coarsest food, practiced the most rigid temperance, walked through the streets of Athens barefoot, without any coat, with a long beard, a stick in his hand and a wallet on his shoulders, and by night, according to the popular story, slept in a tub. See CYNIC SCHOOL OF PHILOSOPHY, THE.

Diomedes, *di'o mee'deez*, in Greek mythology, a king in Thrace who had a number of mares, which he fed on human flesh. All strangers who entered his territory were thrown to these animals to be devoured, until Hercules, overcoming Diomedes, fed him to the horses, which he afterward carried off. A second Diomedes was one of the heroes at the siege of Troy, chiefly noted for having helped Ulysses carry off the Palladium.

Dionaea, *di'o ne'ah*. See VENUS'S FLYTRAP.

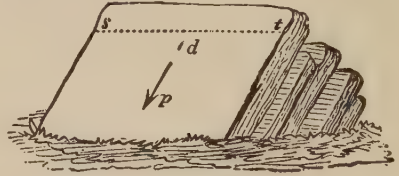
Dionysius, *di'o nish'i us*, the Elder (431?-367 B. C.), tyrant or absolute ruler of Syracuse, a man of obscure parentage. He served in the army, obtained the rank of general and afterward of commander in chief and, gaining the support of the army, seized the supreme power in Syracuse when he was but twenty-five years of age. He extended his rule over other cities in Sicily; and after some successes and reverses in the struggle with the Carthaginians he gained a complete victory over them under the walls of Syracuse. As a patron of art and learning he made Syracuse a brilliant center of Grecian civilization.

Dioram'a, a mode of painting and of scenic representation, invented by Daguerre and Bouton and first exhibited in 1822. It secures a higher degree of illusion than the ordinary panorama, by a mode of uniting transparent painting with opaque painting and causing the light to fall upon the picture both from before and behind. At the same time, by means of colored transparent blinds, suspended both

Diphtheria

above and behind the picture, the rays of light are transmitted and reflected so that a great variety of effects is produced. This method has been used with great success on the stage, in producing fine scenic effects. See PANORAMA.

Dip, in geology, the name given to the angle of slope of inclined rock strata, as *dp* in the diagram. The dip is measured in degrees and is determined by an instrument called the clinometer, which is a square block of wood having a graduated arc and a plummet attached



to one corner. When the block is applied to the rock, so that the plummet is suspended at the highest point, its position on the arc gives the number of degrees of dip. The horizontal direction at right angles to the line of dip is called the *strike*, shown by *st* in the diagram.

Diphtheria, *dif the're ah* or *'dip the're ah*, an infectious and exceedingly dangerous disease, which usually attacks the young in preference to the old. It is caused by a bacillus which has been identified, and the mode of infection is well understood (See GERM THEORY OF DISEASE). In diphtheria the throat is inflamed, and a false membrane forms on the surface. It is not always easy to identify the disease in its early stages, and it is probable that many cases are not properly understood. Diphtheria causes great weakness and nervousness and is frequently accompanied by other diseases, and paralysis may follow at any time within a few weeks after the attack. In every case the patient should be rigidly isolated from every one but the physician and nurses, and placed in a room with as little and as simple furniture as is consistent with comfort. When the patient has recovered, the clothing and furniture should all be thoroughly disinfected, as the germ will remain alive for some time. Within recent years serious epidemics have been prevented by the isolation of patients, and the severity of attacks has been lessened wonderfully by early inoculation with an antitoxin prepared for that especial purpose (See SERUM THERAPY). Physicians claim that if the antitoxin is administered in time, it is almost as certain a specific as vaccination is for smallpox.

Diphthong, *dij'thong* or *dip'thong*, a coalition or union of two vowels in one syllable. In uttering a proper diphthong both vowels are pronounced, but the two sounds are so blended as to form one syllable, as in *void*, *bough*. The term *improper diphthong* is applied to the union in one syllable of two or more vowels, of which only one is sounded, as in *bean*.

Diplo'macy, the science or art of conducting negotiations between nations; the branch of knowledge which deals with the relations of independent States to one another; the agency or management of envoys accredited to a foreign court; the forms of international negotiations. Cardinal Richelieu is generally considered as the founder of that regular and uninterrupted intercourse between governments which exists at present between almost all the Christian powers, though the instructions given by Machiavelli to one of his friends, who was sent by the Florentine Republic to Charles V (Charles I of Spain), show that Richelieu was not the first to conceive the advantages that might be derived from the correspondence of an intelligent agent at the seat of a foreign government. Diplomatic agents are of several degrees: 1, ambassadors; 2, envoys extraordinary and ministers plenipotentiary; 3, ministers resident; 4, *charges d'affaires*; 5, secretaries of legation and *attaches*. See MINISTERS, FOREIGN.

Dip'per or **Water Ouzel**, a remarkable little singing bird, closely related to the thrushes,

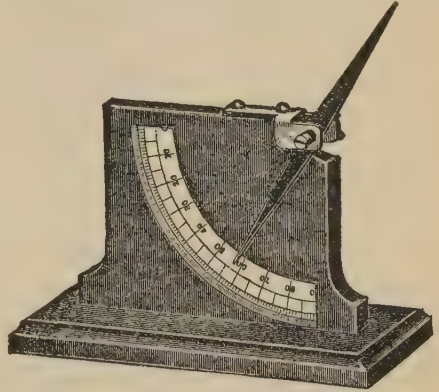


EUROPEAN DIPPER

but resembling the wrens in appearance, especially in its up-tilted tail. It is covered with very close, water-proof plumage and lives about streams, often in the vicinity of waterfalls, into

which it dashes in a perfectly fearless manner. At times it goes entirely through a cascade and finds in the crevices of the rocks back of the water, dry places where it can build its dome-shaped nests and rear its young. The dipper is a rather dark bird with a white breast, and as it moves about it jerks its tail upward and bobs its head downward. There are several species of dippers found in Asia, northern Europe and the highlands of western United States.

Dip'ping Nee'dle, a magnetic needle, so mounted that it can move only in a vertical



DIPPING NEEDLE

direction. The dipping needle is used to test the force of the earth's magnetism at different places on its surface. In the northern hemisphere the north pole dips downward, and in the southern hemisphere, the south pole. At the magnetic equator the needle maintains a horizontal position, but as it is moved north or south from this line it dips downward, the degree of declination indicating the strength of the magnetism. At the magnetic poles the dipping needle assumes a vertical position.

Dip'soma'nia, a species of insanity, in which the patient has at times an ungovernable craving for liquor, which he indulges without restraint. On all other subjects the dipsomaniac may be wholly sound, and between the attacks of his mania he may be an irreproachable person, with a marked aversion to alcohol in any form.

Dip'tera. See INSECTS.

Dir'ec'tory, the name given to the executive body of five men provided for by the Constitution passed in France in 1795. One member of the Directory was to retire each year to make way for a new member. Although in its dealings with internal affairs this body was unpopular from the first, it maintained its power for a

time, owing to the fact that in the early part of its rule the French armies were largely successful. The failure of its military policy made it easy for Napoleon to overthrow it in 1799. See NAPOLEON I.

Dis'count, the charge made by a banker for advancing money on a bill or other document, not yet due. From the face value of the instrument, including interest at maturity, the banker deducts a charge, pays the difference, which is called the *proceeds* of the bill, to the person parting with it, and collects the full amount, when due, to reimburse himself. Popularly, the term *discount* is applied to any deduction from the full amount of an account, made by the party to whom it is paid, especially on prompt or early payment.

Dis'cus, THROWING THE. See ATHLETICS.

Disease, *diz eez'*, ill health not caused by old age. Diseases are frequently classified as *functional* and *organic*. In the former the organs are sound, but from some cause do not work properly; in the latter, the tissues of the organs are not healthy. The most important diseases arise from the presence in the organs of bacteria and of poisonous products formed by foreign substances. See GERM THEORY OF DISEASE; MEDICINE; SURGERY.

Disciples of Christ. See CHRISTIANS.

Disease, GERM THEORY OF. See GERM THEORY OF DISEASE.

Diseases of Plants. A knowledge of plant diseases is of the greatest importance to the farmer. It is estimated that losses amounting to millions of dollars result every year from certain plant diseases. They are generally due to one of the following four causes: fungi, bacteria, insects or physiological causes.

There are fungi which live wholly within the tissues of the plant, those that throw their spores in the air and those that live in the open air, fastening their rootlets to the plant and penetrating openings in the epidermis. When once the plant is attacked, the diseases progress with great rapidity. Familiar examples of diseases by fungi are rusts and smuts of corn, potato rot and mildews (See RUST; GALLS; MILDEWS).

In bacterial diseases insects visiting the plant introduce into the cells bacteria, which, when once they have gained entrance, seem to be beyond control of remedy and cause the injury or death of the plant without delay. It is impossible to cure plants when once infected by bacteria, but it is possible to prevent the spread of the disease to the other plants, by utterly

destroying those which are diseased. The chief examples of these diseases are fire blight of apples and pears, black rot of cabbage, and celery disease, tomato disease and sweet corn disease.

Certain insects, such as the eelworms or the phylloxera, attack various plants. The phylloxera attack grapes and have been very injurious to whole vineyards in Europe. Orange trees, roses and cucumber plants are also subject to the attacks of these worms. It is said that lime is a good remedy, and in greenhouses it is possible to free the soil from infection by baking or freezing it.

The physiological diseases are generally caused by unsanitary conditions, such as improper soil or lack or excess of light or water. The leaves generally turn yellow and drop, and the whole plant assumes an unhealthy appearance.

Dismal Swamp, a large tract of marshy land in the United States, beginning a little south of Norfolk, Virginia, and extending into North Carolina. It is 40 miles long and 25 miles wide. This tract was entirely covered with trees, with almost impenetrable brushwood between them, but it has now in part been cleared and drained. In the midst of the swamp is Lake Drummond. A navigable canal through the swamp connects Chesapeake Bay and Albemarle Sound.

Dispen'sary, a place where free medicines or free prescriptions are given to poor patients who are able to call for them. In all the large cities of the country such places are supported by private funds, or as a regular branch of public benefaction. Though often found to be abused by the well-to-do, the practice is of such service to the poor that it is far better to regulate it carefully by law than to do away with it.

Disraeli, *diz ra'ly*, BENJAMIN, Earl of Beaconsfield (1804-1881), an eminent English statesman and novelist, of Jewish extraction, the eldest son of Isaac Disraeli. In 1826, after an unsuccessful trial of the law, he brought out his first novel, *Vivian Gray*. He then traveled for several years in Italy, Greece, Turkey and Syria, but some political pamphlets which he had published and which had won some attention turned his desires towards politics, and immediately on his return to England he became a candidate for member of Parliament. First he tried to enter the House as a Radical, but finally in 1837 he succeeded in entering Parliament as Tory member from Maidstone. During his first years in Parliament he supported Peel,

but when Peel gave his support to the repeal of the Corn Laws, Disraeli withdrew from his party and soon became recognized in the House as leader of the protectionists. Some years later, feeling that the people did not wish longer a protection policy, he abandoned it. In 1868 Disraeli became prime minister, but his party was defeated at the next election, and not until 1874 did he again come into power. This time, however, he had come in with a strong Conservative majority, and he remained in power for six years. Among the more important events of his premiership was the gaining control of the Suez Canal, the proclamation of Victoria



BENJAMIN DISRAELI

as empress of India and the compelling of Russia by the Treaty of Berlin to abandon a part of her ambitious plans against Turkey. During his term as prime minister, too, Disraeli entered the House of Lords as earl of Beaconsfield. His party was defeated in 1880, and Disraeli withdrew into private life. Much of his power in Parliament he owed to his extraordinary powers as a speaker, and that this was wholly an acquired ability is shown by an incident of his early days in the House of Commons. When he attempted to make his first speech, he was so grandiloquent in manner that he was laughed down. Greatly chagrined, he exclaimed, "I will sit down now, but the time

is coming when you shall hear me."

Disraeli's novels, most noteworthy among which are *Henrietta Temple*, *Coningsby*, *Tancred*, *Sibyl* and *Lothair*, are of great interest, because they deal, from the point of view of an insider, with the society of the aristocracy in Disraeli's day. He did not hesitate to introduce into his books many of the foremost men of the time.

Disraeli, ISAAC (1766-1848), an English man of letters, father of Benjamin Disraeli. The cordial reception accorded his *Curiosities of Literature*, published in 1791, determined much of his after work. Between 1812 and 1822 appeared his *Calamities of Authors*, *Quarrels of Authors* and *Inquiry into the Literary and Political Character of James I*, the three being afterward published collectively under the title of *Miscellanies of Literature*. In 1828 appeared the commencement of his *Life and Reign of Charles I*, a work completed in 1831.

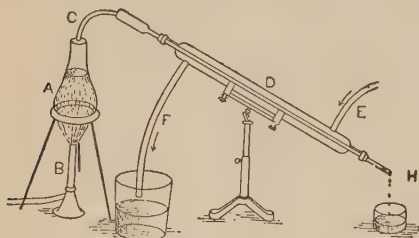
Dis'taff, the first instrument employed in spinning. It consisted of a staff, on one end of which the wool or flax was rolled. The spinner held the distaff in the left hand and drew out the fibers with the right, at the same time twisting them. A small piece of wood, called a spindle, was attached to the thread, the weight of which carried it down as new thread was formed. When the spindle reached the ground, the thread which had been spun was wound round it, and it was then again fastened near the beginning of the new thread. The distaff used with the spinning wheel for flax was made by taking the end of a balsam or other evergreen branch, bending the short twigs back and tying their ends together, thus forming a cone-shaped structure upon which the flax was wound.

Distem'per, a method of painting, in which the colors are mixed with glue, white of egg, gum water or similar substances. This liquid dries very rapidly, so that it is difficult to blend the tints. Distemper is now used in scene painting and in the preparation of wall paper, but before the introduction of oil painting in the fifteenth century it was used in the higher departments of art.

Dis'tilla'tion, a process by which vapors from boiling liquids can be condensed in suitable vessels and thus purified. For example, if water contains certain impurities in solution, it is possible to separate the water from the impurities by boiling the mixture and condensing the water vapor, which is pure. The other

Distilled Liquors

substances are left behind. The apparatus in which this distillation takes place is called a *still*. In the accompanying figure *A* is a reservoir in which the mixture is placed, *B* a lamp



or other source of heat, *C* a tube leading through *D*, a tank containing cold water, and *H* the vessel that receives the condensed liquid. Cold water flows into *D* through *E* and runs out through *F*.

FRACTIONAL DISTILLATION. A mixture of substances which boil at different temperatures can be separated by placing the mixture in the flask *A*, placing a thermometer through the opening and heating to the lowest temperature at which one of the substances will boil. The condensed vapor is free from the other substances. When no more vapor comes over at this temperature, the heat is increased and the substance having the next higher temperature comes off. In this way the different substances may be separated from each other.

DESTRUCTIVE DISTILLATION is not the same as ordinary distillation. In the latter case the substances that boil off are not changed chemically from what they were in the mixture. But in the case of destructive distillation the substances are changed chemically when they are distilled. Wood and coal are the substances usually employed in this kind of distillation. Wood, heated in a closed vessel, is changed to charcoal, while impure acetic acid, tar and some other bodies are driven off and condensed. Coal so heated gives coal gas, and ammonia fumes are driven off, but not condensed; tar is driven off and condensed; coke is left behind.

Distillation is a process used extensively in the arts, as in the making of alcohol and the refining of petroleum.

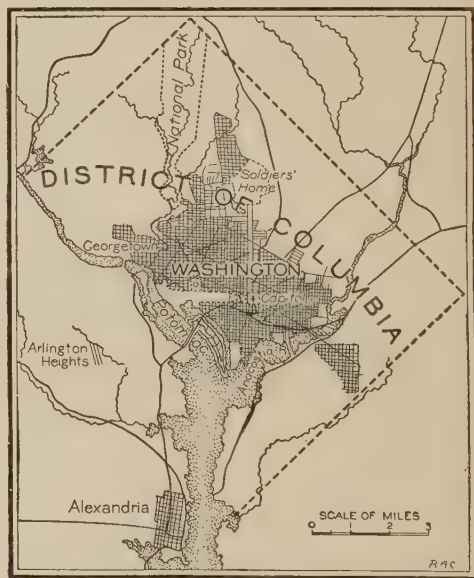
Distilled Liquors, alcoholic liquors manufactured by the combined processes of fermentation and distillation. They may be made from raw material or directly from material which has been fermented, as in the manufacture of brandy by distilling wine. Most of the liquors, such as rum and whisky, are made

District of Columbia

directly from the raw material, corn, wheat and other grains being used. In some countries potatoes are used instead of grain. The grain is ground and soaked in warm water, preparing what is called the *mash*. Yeast is then added to this, and it is allowed to ferment, forming the *wort*. From this the spirit is distilled (See **DISTILLATION**). The distilled spirit usually contains numerous substances that are not desirable, and these are removed by redistilling at different temperatures or by allowing the liquor to stand for a long time, when they are either absorbed or evaporated. The purification is generally known as the process of *rectifying*. Rum is made directly from fermented molasses. See **BRANDY**; **WHISKY**.

D'Istria, *de'stre ah*, DORA. See DORA D'ISTRIA.

Dis'trict of Colum'bia. Provision for the location of the District of Columbia was made in the Constitution of the United States, which decreed that Congress should have power to



exercise exclusive legislation over a tract not exceeding 10 miles square. Both Maryland and Virginia passed acts ceding such a tract to the United States, and in 1790 Congress passed a bill which established the tract upon the Potomac River, but left the President to locate it. This action of Congress, however, was not taken until after a very bitter debate among the members of Congress, many of whom felt it unwise to locate the seat of government in the

Diver

midst of a comparative wilderness. But time has justified, in the minds of the public, the judgment of Washington in fixing upon "the only plot in the United States which had tide-water navigation, convenient access from Baltimore and other large cities northward, and superb natural sites." Originally, the tract contained exactly 100 square miles, a portion being on the south side of the Potomac, but this was ultimately ceded back to Virginia, and the present tract only, whose area is about 69 square miles, was retained. Besides Washington, Georgetown and Uniontown, there are within the District of Columbia several smaller villages (See WASHINGTON). The government of the District is in the hands of three commissioners, two of whom are civilians, directly appointed by the President, and the third, an army engineer detailed by the secretary of war. They hold office three years and are empowered by Congress to make and change at will health and police regulations and to make various laws governing the cities. They appoint all subordinate clerks and officials. Each year they submit to the secretary of the treasury an estimate for all the expenditures of the District during the next year. Half of this amount is assessed as a tax upon the District, and the other half is appropriated by Congress. The population of the District in 1910 was 331,069, of whom about 100,000 were colored.

Di'ver, a water bird related to the grebe. The name is also given to other birds that are skilful divers. The true divers live mostly in the Arctic regions, but comes south in winter. The *great northern diver* and the *red-throated diver* are the most common species. The former has a white breast and a black back and wings, marked by white spots that present a checker-board appearance, while the head and neck are glossy black and green, the latter with a collar of white streaks. The red-throated diver is duller in its coloring. In Scotland this bird is called the *rain goose*, while in the United States the great northern diver is generally



GREAT NORTHERN DIVER

Divine Right of Kings

called the *loon*. The loon nests as far south as the Great Lakes, and most of the small lonely interior lakes of that latitude have one or two pairs of loons during the summer season. Their cries are peculiarly noisy ones, some of their notes resembling rough, jeering laughter. If suddenly startled, especially when they have young in charge, they go through the most astonishing antics on the surface and below the water, trying evidently to distract the attention of their enemy.

Divide', in physiography the name given the crest or water-parting which separates two river systems, or the drainage areas of two smaller streams. The term *watershed* is also used to indicate the same feature. A divide may be comparatively low land, with slopes so gentle that they can scarcely be traced, as the Height of Land, which extends east and west across the central plain of North America and separates the Mississippi basin from that of the rivers flowing into Hudson Bay. It may be very high, like the divide in the Rocky Mountains, that separates the rivers which flow into the Mississippi basin from those flowing into the Pacific. Rivers sometimes cut transverse valleys through a high divide; but this never occurs with a low divide, unless in a few localities the level may be such that in high water one portion of the stream flows down one slope and another portion flows down the other. This is illustrated in the case of Twin River Lake in Yellowstone Park and the Cassiquiare River in South America.

Div'in'a'tion, the act of divining or foretelling future events or discovering things secret or obscure, by the aid of superior beings or by other than human means. In ancient times divination was divided into two kinds, natural and artificial. *Natural* divination was supposed to be effected by a sort of divine inspiration; *artificial* divination was effected by certain rites, experiments or observations, as by sacrifices, observation of entrails and flight of birds, lots, omens and the position of the stars. This sort of divination was practiced by the conjurers, or medicine men, of the American Indians, and traces of it are still found among some tribes. The dreams and visions mentioned in the Old Testament were undoubtedly a sort of divination.

Divine Right of Kings, the claim set up by some sovereigns or their supporters, that they are ruling by appointment of God, inasmuch that, although they may themselves submit to restrictions on their authority, yet a

Diving

subject resisting their acts is considered guilty of a sin. This doctrine, so celebrated in English history, especially in the time of the Stuarts, and in French history of Louis XIV's time, is now rarely defended.

Di'ving, the act of working under water, either with or without a supply of air. In the tropical regions the natives on the shore and those living on islands become expert divers in their quest after sponges and other salable articles obtained from the sea. Some of these are able to remain under water for two minutes, but they suffer from the effects of holding their breath so long.

The oldest successful diving apparatus, known as the *diving bell*, consists of a dome-shaped iron enclosure, open at the bottom and having a shelf or seat on which the diver can sit. When lowered into the water the air prevents the water from filling the chamber, and workmen can remain under water in a diving bell for a number of hours, provided they are supplied with fresh air. This is done by forcing the air into the bell through a tube connected with a force pump, while another arrangement allows the foul air to escape.

The diving bell has been replaced by the diving dress, which is a rubber suit so constructed as to protect the diver from the water. The suit is surmounted by a copper helmet which screws on at the neck and has glass windows in front. In the old-style dress there are also two attachments for tubes that extend to the surface. Through one of these tubes the diver is supplied with fresh air, and through the other the foul air escapes. In the more recent patterns a cylinder for containing compressed air and a compound of soda for absorbing the carbon dioxide from the impure air is found. This cylinder is placed on the shoulders and with it the diver can remain under water for hours without depending upon those above the surface. When he wishes to ascend he lets the air from the cylinder escape into the suit and inflate it until he is able to rise to the surface. All diving suits are heavily weighted with lead or other metal to enable the diver to sink and maintain his position under water.

Diving is practiced for the purpose of cleaning the hulls of ships, laying foundations under water and recovering property from wrecks.

Diving Bell. See **DIVING**.

Divi'ning Rod, a rod, usually of witch hazel, with two forked branches, used by persons who profess to discover minerals or water under ground. The rod, if carried slowly along by the

Divorce

forked ends, dips and points downward, it is affirmed, when brought over the spot where the concealed mineral or water is to be found. The use of the divining rod is still common in many localities, but the wonderful discoveries attributed to it are not well authenticated, and many so-called discoveries have on further investigation proved wholly groundless.

Division, *di vizh'un*, of Labor, the separation of complicated processes into a series of simple operations, employed in all great industries for the simplification of the work to be done by each workman engaged. The principle results in a great saving of time, and much less ability is required on the part of the workman to acquire skill in performing only the particular operation for which he is chosen. Thus the cost of production is immensely reduced. Another great advantage arising from the division of labor is the inducement to the invention of machinery and the tendency to cause machinery to be more effectually used when invented. While it increases the skill and dexterity of individual workmen and conduces to the more economical distribution of labor by classing workmen according to their capacity, it leads to the deterioration in any one laborer's usefulness as an all-round workman.

Divorce, *di vors'*, the dissolution of marriage by a competent legal authority. The significance of the term has of late been narrowed to include only the dissolution of the union from causes arising after marriage, the legal dissolution of a marriage which was void from the beginning being called *nullification*. The decree of divorce is now usually granted by the regularly organized courts, but the rite was formerly purely private, no legal ceremony being necessary. Gradually, with the improvement of religious and moral codes, the laws of divorce have become more stringent. Divorce is not recognized by the Catholic Church, and its priests are not authorized to remarry divorced persons. The same rule long held in England, until an act of Parliament in 1858. Since that time divorces are granted, but rarely, and for only the most important reasons. The divorce laws in the United States are regulated by the states and are widely divergent. One state, South Carolina, does not allow divorce, and the principles governing legislation vary from this strict rule to the greatest laxity. Among the causes for which divorces are granted are unfaithfulness, desertion, habitual drunkenness, cruelty, failure to support, gross immorality and incompati-

bility. In some states divorced persons may remarry without restriction, but in others the rule varies from absolute prohibition of remarriage to some slight restrictions as to time. In the case of divorce, if the wife is blameless she is usually granted a certain specified sum for her support, called *alimony*.

Within recent years there has been a great increase in the proportion of divorces to marriages in the United States, in 1900 the ratio being one to fifteen. Consequently, there has been a growing movement in favor of stricter laws upon the subject. Some students of the problem demand the regulation of divorce by a national law; others, by agreement of uniformity among the states. See MARRIAGE; HUSBAND AND WIFE.

Dix, DOROTHEA LYNDE (1805-1887), an American philanthropist, who was born at Worcester, Mass., and died at Trenton, N. J. An inheritance enabled her about 1830 to give up school teaching and devote her life to philanthropy. Besides her work as a superintendent of hospital nurses in the Civil War, she did much, both in America and Europe, to relieve the harsh life of the inmates of public asylums, prisons and poorhouses. She caused the founding of more than thirty institutions for the insane, who were till her time regarded practically as a criminal class. Her books include many works on philanthropy, besides some children's volumes, such as *Alice and Ruth* and *Conversations about Common Things*.

Dix, JOHN ADAMS (1798-1879), an American statesman and soldier, born in Boscawen, N. H. He saw service in the War of 1812 and remained in the army until 1826, resigning his commission as captain to study law. He was admitted to the bar in 1828 and filled many local and state offices, becoming secretary of state of New York in 1833. He was United States senator in 1845 and secretary of the treasury in Buchanan's cabinet in 1861. It was in that capacity that he issued his famous order, "If any man attempts to haul down the American flag, shoot him on the spot." At the beginning of the Civil War he entered the army, becoming brigadier general and major general of volunteers. In 1866 he was appointed minister to Paris and in 1872 was elected governor of New York. He wrote several books.

Dix, MORGAN (1827-1908), an American clergyman, educated at Columbia University and the General Theological Seminary. In 1855 he became assistant minister of Trinity Church, New York, and seven years later he was made

rector of the parish, holding the position until his death. Among his works are *A Commentary on the Epistle to the Romans*, *Lectures on the Two Estates*, and *Gospel and Philosophy*.

Dixie or Dixie-land, a term which came, by a popular error, to be identified with the South during the Civil War. It is derived from a Northern negro refrain, which was sung in New York about the beginning of the nineteenth century, and which expressed the supposed regrets of the slaves of a man Dixie, who had shipped his slaves to the South as the abolition sentiment grew stronger.

Dixon, ILL., a city and the county-seat of Lee co., on the Rock River, 98 mi. w. of Chicago, on the Chicago & Northwestern and the Illinois Central railroads. The industries include piano, shoe, box, sash and blind and woven-wire factories, a planing mill and a condensed-milk factory. The town is in the center of a rich agricultural region. It was the base of supplies during the Black Hawk War. Dixon was first settled in 1836 by John Dixon. Population in 1910, 7216.

Diz'ziness. See VERTIGO.

Dnieper, ne'pur, a great river of Russia, which rises in the government of Smolensk, flows first southwest, then southeast and again southwest to the Black Sea. It has a total length, including windings, of 1330 miles. Among its tributaries are the Beresina, the Pripet, the Desna and the Psiol. In its lower course there are important fisheries. Between Kiev and Alexandrovsk it forms a series of cataracts, which are now being removed by blasting the rocks. It is navigable for nearly its entire length and is of great commercial importance.

Dniester, nee'stur, a large river of Europe, which has its source in the Carpathian Mountains in Austrian Galicia, enters Russia at Chotin and empties into the Black Sea, after a course of about 850 miles. Its navigation is difficult on account of frequent shallows and rapids, but its commercial importance has been increased by improvements made by the Russian government.

Dobbs Ferry, a village in Westchester co., N. Y., about 21 mi. n. of the center of New York City, on the Hudson River and on the New York Central & Hudson River railroad. It is the seat of residence of many wealthy New York merchants. Population in 1910, 3455.

It has an interesting history connected with the Revolutionary War. It was here in the old Livingston mansion that Washington and Rochambeau planned the Yorktown campaign.

In the same mansion Washington, Clinton and Carleton held a conference regarding the withdrawal of British troops from America in 1783, and opposite this point the first salute to the American flag by a British sloop-of-war was fired.

Dobson, HENRY AUSTIN (1840–), an English critic and poet, born at Plymouth. He was educated in Coventry and Strassburg, with the expectation of being, like his father, a civil engineer. But in 1856 he went into business as a clerk of the Board of Trade and made that his vocation for forty-six years. But his avocation was writing verses, and in this field he accomplished some notable work, especially in the French style of *rondeau* and *ballade*.

Dock, a name applied to different large, herbaceous plants belonging to the rhubarb family. They have stout roots, alternate and often entire leaves, and bear panicles of small, greenish flowers. They are very troublesome as weeds, but the roots of some of them are used medicinally.

Docks are usually artificial enclosures for the reception of vessels, provided with gates to keep in or shut out the tide. They are called *wet docks* when they are intended to receive vessels for loading and unloading, the gates being in this case constructed so as to keep in the tide and thus to preserve the water within the docks as nearly as possible at the uniform level of high water. They are called *dry docks* or *graving docks* when they are intended to admit vessels to be examined and repaired, the gates in this case being such as to keep out the tide while the shipwrights are engaged on the vessel. There is another kind of dry docks, called *floating docks*, which float on the surface of the water and may be sunk sufficiently to allow of a vessel being floated into them, and then raised again, by having the tanks round the sides emptied of water. One of the chief uses of a wet dock is to keep a uniform level of water, so that the business of loading and unloading ships can be carried on without any interruption and without danger of damage to the vessel from straining, low tides or storms.

Dry docks are built of strong masonry, and their entrance is closed either by swinging gates, opening in the middle, or by a framework, called a *caisson*, built like the hull of a ship, with a keel and a stem at both ends. When the caisson is empty it floats and may be removed to admit of a vessel being floated into the dock. The caisson is then placed at the entrance and filled with

water, again sinks into the grooves intended for it and closes the dock. The water is then pumped out, leaving the ship dry and supported by wooden blocks and props. Floating docks are made of wood or steel and are constructed in sections, any number of which can be fastened together to make a basin large enough for the ship. The most important dry docks in the United States are at the government navy yards at Boston, Brooklyn, Philadelphia, Portsmouth, N. H., and Mare Island, San Francisco.

Dockyards, yards supplied with all sorts of naval stores, materials and conveniences for the construction, repair and equipment of ships of war. In the United States the most important dockyards are found at Portland, Maine, Bristol, R. I., New London, Conn., Elizabeth, N. J., near Philadelphia, Wilmington, Del., and Baltimore, on the Atlantic coast, and at San Francisco and Port Orchard, near Seattle, Wash., on the Pacific coast. The dockyards on the Great Lakes are located at Buffalo, Cleveland, Toledo, Detroit, Port Huron, Milwaukee and Chicago. The most important European dockyards are at Glasgow.

Doctrinaire', one who advocates theories of government rather than practical schemes; especially applied to a party of French politicians about 1815, represented by the Duke de Broglie, Royer-Collard, Guizot and others. They favored a constitutional monarchy, with a balance of power similar to that which then existed in Britain.

Dod'der, a peculiar parasitic plant, one species of which is found growing upon plants of the pea family almost everywhere. The plant starts from the ground, sends up long, twining, leafless, yellowish, thread-like stems which fasten themselves by rootlets to the plant and then break loose from the soil. The threads mat together and finally produce dense clusters of small white flowers. Dodder is a member of the convolvulus family.

Dodge, GRENVILLE MELLE (1831–), an American soldier and civil engineer, born in Danvers, Mass. He served with distinction in the Civil War, and in December, 1864, succeeded General Rosecrans in command of the Department of the Missouri. In 1866 he became chief engineer of the Union Pacific railroad, of which he was made a director. He served a term in Congress from Iowa, and in 1898 he was made president of the commission appointed to investigate the mismanagement of the Spanish-American War.

Dodge

Dodge, MARY ABIGAIL (about 1830–1896), an American writer, more commonly known as Gail Hamilton. Her first literary work was done as editor of *Our Young Folks*, a Boston periodical. Among her writings which, though they have no great depth, are attractive by reason of their brilliance, are *Gala Days*, *Woman's Wrongs*, *The Battle of the Books* and *Sermons to the Clergy*.

Dodge, MARY ELIZABETH MAPES (1838–1905), an American writer and editor for children. After the death of her husband, William Dodge, she turned her attention to literary work, contributed to *Hearth and Home* and by 1873 had become the editor of *Saint Nicholas*. This magazine, under her management, became by far the best and most popular juvenile magazine in the United States. She has written much poetry for children, besides several stories, best known of which is *Hans Brinker; or the Silver Skates*.

Dodge, WILLIAM EARL (1804–1883), an American merchant and philanthropist, born at Hartford, Conn. He received a common school education, worked in his father's cotton mill and later removed to New York, where he became a clerk in a wholesale dry goods store and at the end of eight years entered business for himself. Later he became interested in railroad and insurance companies and in mines and lumbering. He accumulated a vast fortune, of which he gave liberally to the Young Men's Christian Association, the Freedmen's Bureau and the temperance and religious propaganda. In 1866 he was elected to Congress as a Republican, and later President Grant appointed him a member of the Indian Commission.

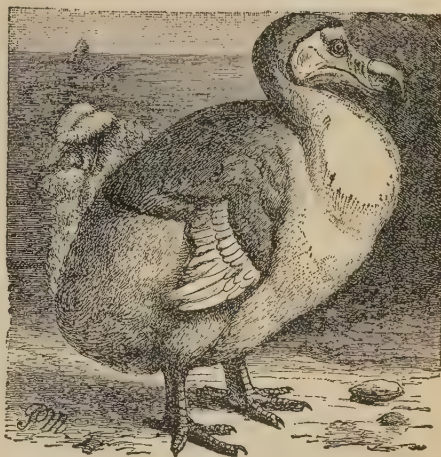
Dodgson, doj'son, CHARLES LUTWIDGE (1832–1898), an English divine, mathematical lecturer and author, educated at Christ's Church College, Oxford. He is most widely known, under the pseudonym of Lewis Carroll, as the author of *Alice's Adventures in Wonderland*, *Through the Looking-Glass* and several other children's classics. He also wrote *Mathematica Curiosa* and *Euclid and His Modern Rivals*.

Do'do, an extinct genus of birds, once abundant on the island of Mauritius and said by naturalists to be related to the pigeons. The dodo was a massive, clumsy bird, larger than a swan, and covered with down instead of feathers. It walked on short, ill-shaped legs and had wings and tail so short as to be useless for flight. Though the bird has been extinct for over two hundred years, there are

Dog

perfect specimens in existence in the British Museum.

Dodo'na, a celebrated locality of ancient Greece, in Epirus, where was one of the most ancient Greek oracles. It was a seat of Zeus,



DODO

whose communications were announced to the priestesses in the rustling of the leaves on its oak tree and in the murmuring of water which gushed forth from the earth.

Dog, a common domestic animal of which there are several wild species, all related to the wolves, jackals and foxes. Wild dogs are found in southern Asia, in the islands of the Pacific, in Australia, where one species is known as the *dingo*, and in India, where the wild dog is called the *dhole*. The origin of the domestic dogs is a much-debated question, some people considering them derived from the wolf. All domestic dogs have several habits of the wolves and jackals, such, for instance, as digging up the earth with their fore feet and throwing it back with the hind feet, and turning around two or three times when about to lie down. The first use of the dog was for hunting, and as he was found teachable, affectionate and faithful, he grew to be man's chief friend among the lower animals.

There are about two hundred breeds of domestic dogs, which vary greatly in size, appearance and structure. Some have long, slender legs (for example, the greyhound); some have short, stout legs (for instance, the dachshund). Some have long, silky hair; some are almost hairless. Some have small, erect ears; others have long and tapering ears. All have certain characteris-

tics which give them a place in man's affection second to no other domestic animal.

No entirely satisfactory classification of the different breeds of domestic dogs has been made, but the following will serve for general purposes. (1) *Wolf-like dogs*. This class includes dogs of a large size, with long hair and erect ears, resembling the wolf in general appearance (See *ESKIMO DOG*; *COLLIE*). (2) *Greyhounds*. Dogs of this class are slender, have fine, soft short hair and little power of scent. They are very fleet runners (See *GREYHOUND*). (3) *Spaniels*. This class is characterized by their long, hanging ears and curly coats. They all like the water and are used in hunting. (See *ST. BERNARD DOG*; *NEWFOUNDLAND DOG*; *SPANIEL*). (4) *Hounds*. Hounds are distinguished by their short hair, long noses and long, hanging ears, and by the keen scent which guides them in tracing game (See *BLOODHOUND*; *FOXHOUND*; *POINTER*; *SETTER*). (5) *Mastiffs*. These dogs have large heads and large, strong jaws (See *BULLDOG*). (6) *Terriers*. This is a distinct class, including many varieties, which differ widely from one another. They have short or long hair, the ears are erect and the bodies are usually light. See *TERRIER*; *SCOTCH TERRIER*; *DANDIE DINMONT*; *FOX TERRIER*; *SKYE TERRIER*.

Dogbane, an American plant, found from Canada to Carolina. The whole plant has a milky juice, and the root is intensely bitter and nauseous. It is employed in America in the place of ipecac. Another species yields a useful fiber and is known as Canada, or indian, hemp.

Dogcart, a light pleasure cart, with two seats placed back to back. The cart derives its name from the box under the rear seat, which was originally used for carrying dogs.

Dog Days, the name applied by the ancients to a period of about forty days, the hottest season of the year, at the time of the rising of Sirius, the dog star. Though the star now rises at a different time, we still apply the term *dog days* to the hottest season of the year.

Doge, *doje*, the title of the first magistrate in the old Italian republics of Venice and Genoa. The first doge of Venice elected for life was Paolo Anafesto, in 697; and in Genoa, Simon Boccanera, in 1339. In the former city the dignity was always held for life; in the latter, in later times, only for two years. In both cities, the office was abolished by the French in 1797.

Dogfish, a name given to several species of small shark, common around the British Isles,

so named from their habit of pursuing prey like dogs hunting. The rough skin of one of the species, the *lesser spotted dogfish*, is used in polishing various substances, particularly wood. This species is rarely three feet long. The *greater dogfish* is from three to five feet in length. It is blackish-brown in color, marked with numerous small dark spots. Both species are very voracious and destructive. Their flesh is hard, dry and unpalatable. The *common*, or *picked*, *dogfish* is common in North American seas and is sometimes used as food. On the Pacific coast oil is made from the livers of the dogfish.

Doggerbank, an extensive sand bank in the North Sea, about midway between the shores of England and Denmark, beginning about thirty-six miles east of Flamborough Head and extending in an easterly-northeasterly direction to within sixty miles of Jutland. In some places it is sixty miles wide. It is celebrated for its cod fisheries.

Dogma, an article of religious belief; one of the doctrines of the Christian faith. The history of dogmas, as a branch of theology, gives the origin and the changes of the various Christian systems of belief, showing what opinions were received by the various sects in different ages of Christianity, the sources of the different creeds, by what arguments they were attacked and supported, what degrees of importance were attached to them in different ages, the circumstances by which they were affected and the mode in which the dogmas were combined into systems. Lectures on this subject are common in the German universities.

Dog Star. See *SIRIUS*.

Dog's-tooth Violet, the common name for certain plants of the lily family. They are natives of the cooler temperate regions, and most of them belong to North America. Two smooth and usually mottled leaves spring from a scaly bulb. A single nodding yellow, purplish or white flower is borne from between the leaves on a short stem. It is one of the very pretty early spring flowers of the Northern states.

Dog'watch, a nautical term distinguishing two watches of two hours each (4 to 6 P. M. and 6 to 8 P. M.). All the other watches count four hours each, and if the dog watches were not introduced the same portion of the crew would always keep watch during the same hours.

Dog'wood. See *CORNEL*.

Dol'drums, among seamen, the parts of the ocean near the equator, that abound in calms, squalls and light baffling winds.

Dole, NATHAN HASKELL (1852-), an American author, born in Chelsea, Mass. He graduated at Harvard and taught in several academies before entering journalism. He was for a time literary and musical editor of the *Philadelphia Press*, and later he served with publishing houses. Among his original works are *The Building of the Organ*; *The Hawthorn Tree*, and *Other Poems*; *Omar, the Tentmaker—A Romance of Old Persia*, and some history and biography for young people. Dole has translated works from the Russian, Polish, German, Spanish, Italian, Swedish and Danish, including Halévy's *L'Abbe Constantin*, Daudet's *Tartarin de Tarascon*, books by Count Tolstoi and many songs. He has also edited many collections of prose and verse, including Tolstoi's works, a *Young Folks' Library* and a comprehensive variorum edition of *The Rubaiyat of Omar Khayyam*, containing parallel translations in many European languages.

Dole, SANFORD BALLARD (1844-), a Hawaiian statesman, of American parentage, born in Honolulu. He graduated at Williams College (Mass.) and was admitted to the bar in Boston. Returning to Hawaii, he was made judge of the Supreme Court in 1887. After the revolution of 1893 he became president of the provisional government, and in the following year he was chosen president of the Hawaiian republic. Upon the conversion of Hawaii into a territory of the United States, he became its governor (1900), but, resigning in 1903, was appointed United States district judge of the territory. See HAWAII.

Dollar, a silver or gold coin, the unit of the monetary systems of the United States and Canada, with a value of 100 cents. It is equivalent to about 5.18 French francs, Italian lira or Spanish pesetas; .205 English pound sterling; 4.2 German marks; 3.73 Danish, Swedish and Norwegian crowns; 1.94 Russian rubles. The same name is given to different coins of almost the same weight but of half the value, which are current in Mexico, South America, Straits Settlements and the Philippine Islands. The name is derived from the Dutch *daler* or German *thaler*, but the coin used in the United States was patterned on "the Spanish milled dollar." The dollar was established as the monetary unit of the United States by an act of Congress under the Confederation in 1787, the decimal system of coinage having been established the year before. The first United States silver dollars were made in 1794. On March 14, 1900, an act was passed

which made the gold dollar the standard in the United States, but no provision was made for coining it. Silver dollars have not been coined since 1905. See COINING; MONEY; also MONEY AND BANKING, in Volume VI.

Döllinger, *döl'ling ur*, JOHANN JOSEPH IGNAZ VON (1799-1890), a celebrated German theologian and leader of the Old Catholic party, born at Bamberg, in Bavaria. In 1822 he entered the Church and soon after published *The Doctrine of the Eucharist during the First Three Centuries*, a work which won him the position of lecturer on church history at the University of Munich. He held this position, with the exception of 1847 to 1849, till 1871. In later years he took an active part in the political struggles of the time as representative of the university in the Bavarian Parliament, and, as delegate at the Diet of Frankfort he voted for the total separation of Church and State. After a visit to Rome he announced that the temporal sovereignty of the pope was not necessary for the progress and continuance of the Roman Catholic Church. He opposed the doctrine of infallibility of the pope and was excommunicated in 1871. He organized the Old Catholics in 1871 and worked for the union of Christian churches. The University of Munich celebrated his ninetieth birthday with festivities.

Dolliver, JONATHAN PRENTISS (1858-1910), an American lawyer and statesman, born in Preston co., Va. He graduated from West Virginia University in 1875, was admitted to the bar three years later and began the practice of law in Iowa. He was elected to Congress continuously from 1889 to 1901, in the latter year was appointed United States senator for an unexpired term and was elected in 1902. In the Senate he became a leader of his party, being especially conspicuous as an advocate of Federal regulation of railroad rates.

Dolomite or **Magnesian Limestone**, a rock and mineral, composed of carbonate of calcium and carbonate of magnesium and varying in color from gray or yellowish-white to yellowish-brown. It abounds in the Apennines, Tyrol, Switzerland, Tuscany and England. In the United States it occurs in western New England, eastern New York, Georgia and Tennessee. The finest varieties are known as marble (See MARBLE). A variety called *bitter spar*, and sometimes *rhomb spar*, is found in crystals having the form of a rhomboid. In color it is gray, yellow or reddish-brown, and it is semi-transparent. It is easily scratched with a

knife. A second variety is called *pearl spar* and has crystals of curvilinear faces and of a pearly luster.

Dolphin, *dol'fin*, an animal which forms the type of a family that includes, also, the porpoise and the narwhal. It inhabits every sea from the equator to the poles. The common dolphin measures from six to ten feet in length and has a sharp snout about a half-foot long. It is usually black above, gray on the sides and white beneath. Its flesh is coarse, rank and disagreeable, but it is used by the Laplanders as food. The dolphins live on fish and mollusca, and often they may be seen in great numbers round shoals of herring. They have to come to the surface at short intervals to breathe. The structure of the ear renders the sense of hearing very acute, and the animals are observed to be attracted by regular or harmonious sounds. Compactness and strength are the characteristics of the genus, and they swim with extraordinary velocity. The dolphin is most common in the Mediterranean, but one species, the *bottle-nosed*, is caught on the coast of New Jersey. Other species which are taken off the coast of the United States are the *black dolphin* and the *spotted dolphin*. The name is also commonly but improperly given to a fish of the mackerel family, the beauty of whose colors when dying has been much celebrated by poets. In Greek mythology the dolphin was sacred to Apollo. Its image appeared on Greek coins and is said to have been represented on the shield of Ulysses.

Dome, a vaulted roof, in the shape of a hemisphere, or sometimes of an octagon or an ellipse, covering a building or part of it and forming a common feature of Byzantine and Renaissance architecture. *Cupola* is often used as a synonym, but, strictly speaking, the latter term refers to the interior, *dome* being applied to the exterior, though in common usage the entire structure is included under the name dome. The Byzantines first used the dome in their churches and made it a distinctive feature of their architecture. Prior to the time of the building of the Church of Saint Sophia in Constantinople, all domes were placed on circular supports, as there was no known way to make them fit on square walls, but in this great church the difficulty was solved (See PENDENTIVES). The Arabs copied the dome from the Byzantine models and used it extensively in their architecture, especially in their mausoleums and mosques, of which the Mosque of Omar in Jerusalem is one of the

earliest specimens. Most modern domes are semi-elliptical and are constructed of timber, but the ancient domes were nearly hemispherical and were constructed of stone. The finest, without any rival, ancient or modern, is that of the Rotunda or Pantheon at Rome, 140 feet in diameter and 143 feet in height, erected under Augustus and still in perfect condition. Among others the most noteworthy are Saint Peter's at Rome, 138 feet in diameter; Saint Paul's in London, 102 feet in diameter, and that of the Hotel des Invalides in Paris, 92 feet in diameter. The finest dome in the United States is that of the Capitol at Washington, measuring 96 feet in diameter.

Domenichino, *do ma'ne ke'no*, or **Domenico Zampieri** (1581-1641), an Italian painter of great eminence, belonging to the Bolognese school. He was born at Bologna and studied under Annibale Carracci, and afterward at Rome, where he became painter to Pope Gregory XV. His paintings are especially noted for their lifelike human figures. Among his best works are the *Communion of Saint Jerome*, in the Vatican Museum, considered by some almost the equal of Raphael's *Transfiguration*; the *History of Apollo*; the *Martyrdom of Saint Agnes*, and the *Triumph of David*.

Domesday doomz'day, **Book**, or **Doomsday Book**, a book containing a survey of the lands in England, compiled by the order of William the Conqueror, about 1086. The survey was made by commissioners, who collected the information in each district from a sworn jury consisting of sheriffs, lords of manors, presbyters, bailiffs, villeins—all the classes, in short, interested in the matter. The extent, tenure, value and proprietorship of the land in each district, the state of culture and in some cases the number of tenants, villeins and serfs were among the matters recorded. The survey was completed within a year. Northumberland, Durham, Cumberland and Westmoreland were not included in the survey, probably for the reason that William's authority was not then fully settled in those parts. The Domesday Book consists of two volumes, one folio and one quarto. It has been twice republished, the last time (1861-1865) in perfect facsimile.

Domestic Science. See VOLUME VI.

Dom'nic, SAINT (1170-1220), a famous Catholic churchman, a Spaniard by birth. He traveled as far as Denmark and spent the last six years of his life working for the order of the Dominicans, which he founded. He also

founded an asylum for women, which became an order of nuns, that he might keep them from the influence of the Albigenses. He and Saint Francis of Assisi were such close friends that their feasts are celebrated to-day by both the mendicant orders, Dominicans and Franciscans.

Dominica, *do me ne'kah*, a British West India island, a member of the united colony of the Leeward Islands, between Martinique and Guadeloupe. It covers an area of 291 square miles. It is rugged and mountainous, but it contains many fertile valleys and is well watered. The shores are but little indented and are entirely without harbors, but on the west side there are several good anchorages and bays. The principal exports consist of sugar, molasses, cocoa and lime juice. Roseau is the capital. The ownership of Dominica alternated between France and Great Britain until 1814. Population in 1911, 33,863.

Dominical Letter or Sunday Letter, in chronology, one of the seven letters of the alphabet, A B C D E F G, used in calendars to mark the first seven days of the year and all consecutive sets of seven days, to the end of the year, so that the letter for Sunday will always be the same. If the number of days in the year were divisible by seven without remainder, then the dominical letter year after year would be the same; but as it is, the year begins and ends on the same day, and therefore the dominical letters go backward one day each year. In leap years they go backward two days, so that the same series is not repeated till after four times seven, or twenty-eight years.

Dominican Republic. See SANTO DOMINGO.

Dominicans. This order of preaching friars was founded in 1215 by Saint Dominic, who wished to increase the influence of the Church. He obtained confirmation for his order from Pope Honorius III in 1216, and this gave the friars the right to preach and to hear confessions everywhere. They are bound by the vows of chastity, poverty and obedience, are forbidden ever to eat meat, and they rise at midnight for prayer. They are missionaries at home and abroad and have always preached faithfully, but have been displaced in part by the Jesuits. They were known in France as Jacobins, in England as Black Friars, from the black cloak and hood which they wore. Four popes have been Dominicans. Among painters in the order were Fra Angelico and Bartolommeo. In

theology were Thomas Aquinas and Albertus Magnus. The office of master of the sacred palace is hereditary in the order. A Franciscan always presided over the inquisition.

Dominoes, *dom'in oze*, a game played with small, flat, rectangular pieces of ivory, about twice as long as they are broad. Each piece is divided in the middle by a line, and each of the squares thus made is blank or marked by dots, from one to six or twelve in number. When one player leads by laying down a domino, the next must follow by placing alongside of it another, which has the same number of spots on one of its sides. Thus, if the first player lays down 6-4, the second may reply with 4-8, or 6-7; in the former case he must turn in the 4, placing it beside the 4 of the first domino, so that the numbers remaining out will be 6-8; in the latter case he must turn in the 6 to the 6 in like manner, leaving 4-7, to which his opponent must now respond. The player who cannot follow suit loses his turn, and the object of the game is to get rid of all the dominoes in hand, or to hold fewer spots than your opponent when the game is exhausted by neither being able to play. Other games with different styles of counting are played with dominoes.

Domitian, *do mish'e un*, (?-96), a Roman emperor, son of Vespasian and brother of Titus, whom he succeeded in 81. At first he ruled with a show of moderation and justice, but soon returned to the cruelty and excesses for which his youth had been notorious. He was at length assassinated.

Don (ancient Tanais), a river of Russia, which issues from Lake Ivan-Ozero, in the government of Tula, and flows southeast through the governments of Ryazan, Tambov, Voronej and Don Cossacks, to within 37 miles of the Volga, where it turns abruptly southwest for 236 miles and falls into the Sea of Azov. The length of the whole course is nearly 1150 miles. The chief tributaries are the Donetz and Voronej, on the right, and the Koper and Manitsch, on the left. The Don carries a large traffic, especially during the spring floods, and a canal connects it with the Volga system of navigation. It has also very extensive and productive fisheries.

Donahoe, PATRICK (1811-1901), born in Muntery, Ireland, founder of the *Pilot*, the leading Catholic journal in the United States. He was prominent in charities and was one of the founders of the Boston Home for Destitute Catholic Children.

Don'atel'lo or **Donato**, *do nah'to*, (1386?-1466), an Italian sculptor, one of the most famous of the early Renaissance and one of the greatest of all time. He was born at Florence and was brought up in the home of Martelli, a wealthy relative. Early he became associated with Brunelleschi, the architect, from whom he gained much encouragement and help. In 1403 they went to Rome and studied together, but two years later Donatello was back in Florence. His first great works were *Saint Peter* and *Saint Mark*, in the Church of Saint Michael in Florence. In 1433 Donatello went to Rome again, and the works produced during his stay there show to a great extent the influence of classical art on his sculptures. The next year he returned to Florence and was employed by his friend and patron Cosimo de Medici, for whom he designed a beautiful bronze *David*, one of his finest works. In 1444 he went to Padua and there produced a bronze equestrian statue of Erasmo de Narni, called *Gattomelata*, which is his greatest work. After visiting Venice, Ferrara and other cities, he returned to Florence in 1457 and passed the rest of his life there. The distinguishing features of his art are realism and originality. He was the most revolutionary of artists, and though he closely followed antique models, his productions are not imitations, but are original and true to nature. His influence affected the sculpture of Florence throughout the fifteenth century, up to the time of Michelangelo.

Donati's, *do nah'teez*, **Comet**, so called from the Italian astronomer Donati, who first observed it, in June, 1858. Next to the comet of 1811 it is the most brilliant that has appeared this century. It was nearest the earth on Oct. 10, 1858.

Don'gola, a province of Upper Nubia, Egypt, on both sides of the Nile. It formerly belonged to Egypt and was the seat of a pasha, but since the evacuation of all the country south of Wada Halfa in 1886 by the Egyptian government it has been left in an unsettled state. Its chief products are dates, cotton, indigo and maize. The population is a mixture of Arabians and indigenous Nubians. The chief town is Dongola, or El Ordeh, on the left bank of the Nile. Population, 6000.

Doniphan, *don'i fan*, **ALEXANDER WILLIAM** (1808-1887), an American lawyer and soldier, born in Mason County, Ky. He graduated at Augusta College in 1824, was admitted to the bar in 1830 and began to practice in Lexington, Mo. For several terms he served in the state

legislature. He was made colonel of a regiment of mounted veterans, equipped for the army of the West at the beginning of the Mexican War, and he did good service. Before the Civil War he was a commissioner from Missouri to the Peace Convention in Washington, which endeavored to avert the war.

Do'nizet'ti, **GAETANO** (1797-1848), a famous Italian composer. In 1835 he produced the operas *Lucia di Lammermoor* and *Lucrezia Borgia*, both emphatically successful, the first of which was probably his most famous work and is still considered his masterpiece. In the same year he removed to Paris, where he wrote and produced several operas, *Les Martyrs*, *La Favorita*, *La Traviata*, *Don Pasquale* and *La Fille du Regiment*, all of which are still popular. The famous sextette from *Lucia* is one of the most beautiful passages ever written.

Don Juan, *don hwaahn*, the hero of a Spanish legend, which seems to have had some historical basis in the life of a member of the noble family of Tenorio at Seville. According to the legend, Don Juan was recklessly immoral. An insult to the daughter of a governor of Seville brought the indignant father and the profligate don into deadly conflict, in which the former was slain. Don Juan afterward, in a spirit of wild mockery, went to the grave of the murdered man and invited his statue to a revel. To the terror of Don Juan, the "stony guest" actually appeared at the table to bear him away to hell. The legend has furnished the subject for many dramas, among them Molière's *Don Juan* and Shadwell's *The Libertine*, and for many operas, the most famous of which is Mozart's *Don Giovanni*. The *Don Juan* of Byron bears no relation to the old story, except in the character of the hero.

Don'key, the name given to the ass when domesticated. See **ASS**.

Don'nelly, **IGNATIUS** (1831-1901), an American journalist and politician. He studied law, was admitted to the bar and in 1856 went to Minnesota, where he was three years later elected lieutenant governor. From 1863 to 1869 he was in the House of Representatives, for many years he was in the state legislature and twice he was nominated for vice-president of the United States by the People's party. Among his writings the one which attracted most attention was *The Great Cryptogram*, which attempted to prove, by means of a word-cipher, that Bacon wrote Shakespeare's plays.

Don Quix'ote (Spanish *ke ho'ta*), the title of a famous romance by Cervantes. See CERVANTES SAAVEDRA, MIGUEL DE.

Doo'ley, Mr. See DUNNE, FINLEY PETER.

Do'ra D'Istria, de'stre ah, (1828-1888), the pen name of Helen Ghika, a Rumanian writer. She attempted at fifteen a translation of the *Iliad* into German, and this was followed by several dramatic writings. Her first work of note was *Monastic Life in the Eastern Church*, and this was followed by *German Switzerland* and *Women in the East*. Her *Pilgrimage to the Tomb of Dante* contains an account of the sixth centenary festival in honor of Dante's birthday. She wrote various other works on Switzerland, Venice and Rumania.

Dordrecht, dor'dreKt, or Dort, a town of the Netherlands, in the province of South Holland, 14 mi. n. e. of Rotterdam, on an island separated from the mainland by an inundation in 1421. It was formerly of more importance than now, but it still carries on an extensive trade. It has shipbuilding docks, sugar refineries, sawmills and manufactures of tobacco and white lead. It was here that the Synod of Dort met in 1618 and condemned the doctrines of Arminius. Population in 1910, 46,862.

Doré, do ra', PAUL GUSTAVE (1833-1883), a prolific French draftsman and painter, born at Strassburg. He distinguished himself greatly as an illustrator of books. His illustrations of Rabelais, of Perrault's *Tales*, Sue's *Wandering Jew*, Dante's *Divina Commedia* and Cervantes's *Don Quixote* displayed great fertility of invention and acquired for him a European reputation. Doré's pictures are especially interesting because of the wonderful imaginative power and dramatic sentiment revealed in them. His use of landscape is often very effective in portraying certain gloomy and weird scenes. *Christ's Entry into Jerusalem* and *Paul and Francesca da Rimini* are among Doré's best-known pictures, but his illustrations of the Bible are probably the most widely known of his works.

Dore'mus, MRS. SARAH PLATT (HAINES) (1802-1877), an American philanthropist, born in New York City. She inherited a large fortune and early began to devote it to philanthropic enterprises, founding numerous homes and hospitals, especially for women. Among these were the Isaac T. Hopper Home for women discharged from prison, the New York Women's Hospital, and the House and School of Industry for poor women. She also established,

in 1860, the Women's Union Missionary Society, and during the war she was conspicuous in the service of wounded soldiers.

Dor'ians, one of the four great branches of the Greek nation. They migrated from Thessaly southward in the twelfth or eleventh century B. C., settling for a time in the mountainous district of Doris, in Northern Greece, and finally in Peloponnesus.

Doric Order. See COLUMN.

Dor'ion, ANTOINE, Sir (1818-1891), a Canadian lawyer and politician, born at Saint Ann de la Perade, educated at Nicolet College and admitted to the bar in 1842. He was elected to the Canadian assembly and from 1867 to 1874 was a member of the Dominion Parliament, where he led the French-Canadian Liberal party, known as the *Rouge*. He also held important positions in the ministry, and in 1874 he became chief justice of the province of Quebec. He was knighted by Queen Victoria in 1877.

Dor'mer Window, a window set in the gable of a sloping roof, the frame being nearly vertical to the rafters. It was an important feature in early Gothic architecture and in the later Renaissance. See GABLE.

Dor'mouse, a small rodent, common in Europe, resembling the squirrel in its habits



DORMOUSE

and in its hairy tail. These little animals inhabit temperate and warm countries and subsist entirely on vegetable food. Their pace is a kind of leap, but they have not the activity of squirrels. While feeding, they sit upright and carry the food to the mouth with their paws. The dormice pass the winter in a torpid state, reviving only for a short time on a warm, sunny day, when they take a little of their hoarded stores and then relapse into sleep. Among the different species are the *fat dormouse* and the *garden dormouse*.

Dorr, THOMAS (1805-1854), an American politician, the leader of Dorr's Rebellion in Rhode Island. He was born at Providence, R. I., and was educated at Harvard College.

Dortmund

He was a member of the Rhode Island legislature, 1833-1837, and there headed a party for extending the suffrage, which was still restricted, according to the old charter, by a property qualification. Two constitutions were placed before the people for adoption, and that embodying Dorr's reform received a majority of votes, but it was declared illegally adopted. Dorr was also elected governor, and his followers attempted to sustain their government by force of arms. The attempt failed, Dorr was convicted of treason and was sentenced to imprisonment for life, but was afterwards pardoned.

Dortmund, a city of Prussia, in the province of Westphalia, situated on the Emster, 73 mi. n. e. of Cologne. It has four churches, which are its most noteworthy structures. Dortmund has rapidly increased in population in recent years, its prosperity being due to its situation upon several important railway systems, to the opening of extensive coal mines in the vicinity and to the active manufacture of iron, steel and machinery. There are also a number of breweries, potteries, tobacco factories and chemical works. Dortmund was once a free imperial Hanseatic town and was the seat of the chief tribunal of the Vehme. Population in 1910, 214,333.

Douai, *doo a'*, **Bible**, the English translation of the Bible used among English-speaking Catholics and executed by divines connected with the English College at Douai. The New Testament was published in 1582 at Rheims; the Old, in 1609, at Douai. The translation is made from the Vulgate, or Latin version, which, according to a decree of the Council of Trent, was made the standard Bible of the Roman Church. Protestant versions have changed it.

Double Stars, a pair of stars revolving about a common center. It is thought probable that wherever two stars appear very close together in the heavens, they revolve about each other. Sometimes a revolution requires centuries, sometimes it requires thousands of years; so that it is difficult to prove the phenomenon in any particular case. In some of these systems of double stars, the colors are beautifully contrasted, the larger one being orange or red, and the smaller showing its complement, blue or green. See **ALGOL**.

Douglas, *dug'las*, the capital of the Isle of Man, a popular watering place. It is frequented by immense numbers of visitors during the summer. Among the objects of interest

Douglas

are the House of Keys, the customhouse, the extensive breakwater, the promenade and the tower of refuge, built in 1833 for the safety of shipwrecked mariners. Population, 23,000.

Douglas, **STEPHEN ARNOLD** (1813-1861), an eminent American statesman and politician, born in Brandon, Vt. During early life he worked on a farm and taught a country school; then he moved to Illinois, where he was admitted to the bar at Jacksonville. Within a year from



STEPHEN A. DOUGLAS

this time he was elected prosecuting attorney for his district and rapidly rose in his profession. He was elected to the lower house of the state legislature in 1836, and in 1841 he was appointed secretary of state for Illinois, but resigned to become judge of the supreme court. Two years later he entered the national House of Representatives, and in 1847 he was chosen United States senator, which position he filled until his death. In Congress and before the people, Douglas attained a high reputation as an orator and, being of slight stature, was popularly known as the "Little Giant." He became a leader of the Democratic party, favoring the annexation of Texas, the Mexican War and most of the measures looking toward the extension of slavery. He opposed the Wilmot Proviso but upheld the compromise of 1850.

As an advocate of slavery he was careful not

to alienate the people of either the North or the South, since it was his ambition to become president of the United States. He therefore introduced into Congress the doctrine known as "popular" or "squatter" sovereignty, which held that to the citizens of each territory belonged the right to determine, through their representatives, whether slavery should be admitted to that territory, but that meanwhile slavery should be allowed. Douglas was therefore the most conspicuous supporter of the Kansas-Nebraska Bill, which applied the doctrine of squatter sovereignty to the territory of Nebraska, which then included Kansas, Nebraska, the Dakotas, Montana and parts of Wyoming and Colorado. No single event of the period before the Civil War had greater influence in arousing anti-slavery agitation than this law. In 1858 Douglas was opposed in his campaign for reelection by Abraham Lincoln, who had risen to prominence in Illinois. During this campaign occurred the famous debates between Lincoln and Douglas, in which the whole problem of slavery and its extension was discussed with remarkable ability by both candidates. Though Douglas was successful, his infirm position upon the slavery question cost him the support of the southern wing of his party in his campaign for the presidency in 1860. Though nominated by the Northern Democrats, he received only twelve electoral votes, those of Missouri and part of New Jersey. However, he received a popular vote second only to that of Lincoln. When the Civil War broke out, and the issue was between union and secession, he was a strong supporter of President Lincoln, but died a few months after the beginning of the struggle. See KANSAS-NEBRASKA BILL; SQUATTER SOVEREIGNTY.

Douglas, WILLIAM LEWIS (1845-), an American capitalist, manufacturer and politician, born at Plymouth, Mass. From early childhood he worked in shoe and cotton factories, and finally in 1876 he settled at Brockton, Mass., where he opened a small shoe shop, from which one of the largest shoe factories in the world has grown. He served several terms in the state legislature, was mayor of his city in 1891 and in 1904 was elected governor of Massachusetts as a Democrat, but declined a second nomination.

Douglass, FREDERICK (1817-1895), an American lecturer and journalist, son of a negro slave, born at Tuckahoe, in Maryland. Although his father was a white man, he was, according to the law, reared as a slave. In 1832 he was

purchased by a Baltimore shipbuilder, but made his escape in 1838. As he had taught himself to read and write and showed talent as an orator, he was employed by the anti-slavery society as one of its lecturers, and he also published several anti-slavery papers. In 1845 he published his autobiography, and afterward he made a successful lecturing tour in England. After the war he started a journal entitled *The New National Era*. Douglass was appointed secretary of the commission to Santo Domingo in 1871, presidential elector for New York in 1872, later marshal for the District of Columbia, recorder of deeds for that district and United States minister to Hayti.

Doom Palm, *doom'pahn*, a palm tree, remarkable for having a repeatedly-branched



DOUM PALM

stem. Each branch terminates in a tuft of large, fan-shaped leaves. The fruit is about the size of an apple. It has a fibrous, mealy rind, which tastes like gingerbread and is eaten by the poorer inhabitants of Upper Egypt, where the doum palm grows.

Douro, *do'e ro*. See DUERO.

Dove, *duv*, a name which scientifically has no distinction from pigeon, but which is commonly applied to a few species of pigeons only (See TURTLE DOVE). In poetry and in legend the dove has always been the symbol of innocence, gentleness and love, and in the Christian religion it has occupied a prominent position.

It was a dove that Noah sent from the ark; a dove rested on the head of Christ after his baptism, and Saint John "saw the Spirit descending from heaven like a dove." The dove appears in innumerable pictures throughout all periods of Christian art.

Do'ver, DEL., the capital of the state and the county seat of Kent co., 48 mi. s. of Wilmington, on Jones Creek and on the Philadelphia, Wilmington & Baltimore railroad. The town is in a fruit region and contains fruit-canning and evaporating works, sawmills, foundries and machine shops. Wilmington Conference Academy and an agricultural and manual training school for colored students are located here. The statehouse, the county courthouse and the postoffice are important buildings. Dover was settled in 1717. It was made the capital in 1777 and was incorporated as a town in 1829. Population in 1910, 3720.

Dover, a borough of England, in the county of Kent, 67 mi. s. e. of London. It lies on the coast of the Strait of Dover and is 21 miles distant from Calais, on the French coast. It is an important railway terminus, and as a port for mail and packet service with the continent it has a large passenger traffic. Ship-building, sailmaking and fisheries are the chief industries. The harbor has been much improved in recent years. The entrance is protected by the Admiralty Pier, which is nearly half a mile in length. The celebrated castle of Dover stands on a chalk cliff 350 feet in height. Population in 1911, 43,600.

Dover, N. H., the county-seat of Strafford co., 10 mi. n. w. of Portsmouth, on the Cohecho River and on branches of the Boston & Maine railroad. The river furnishes water power for the manufactures, which include machinery, cotton and woolen goods, lumber products, brick, hats and shoes. The city has a public library, a fine townhall, an opera house, Saint Joseph's Hill School and Franklin Academy. The place was settled in 1623 and is the oldest town in the state. It received its present name in 1639. As a frontier settlement during the seventeenth century, it suffered greatly from Indian attacks. Population in 1910, 13,247.

Dover, N. J., a town in Morris co., 28 mi. w. of Newark, on the Rockaway River, the Morris Canal and on the Lackawanna and the New Jersey Central railroads. Its industries include railroad shops, rolling mills, furnaces and machine shops and manufactures of silk and knit goods. Close by are several well-

known summer resorts and a national powder depot. Dover was settled in the middle of the eighteenth century. Population in 1910, 7468.

Dover, STRAIT OF, the narrow channel between Dover and Calais, which separates Great Britain from the French coast. At the narrowest part it is only 21 miles wide. The depth of the channel at a medium in the highest spring tides is about 25 fathoms. On both the French and English sides are chalk cliffs, which show a correspondency of strata.

Dow or **Dou**, GERARD (1613-1675), an eminent painter of the Dutch school, was born at Leyden. He studied under Rembrandt and united his master's manner in handling light and shade with the most minute finish and delicacy. His first work consisted chiefly of portraits, but later he gave his attention to genre painting and soon excelled in scenes of domestic and common life, which he depicted in a tender and charming style. The chief fault of his work is excess of unimportant details. The best specimens of his art are *Woman Sick of the Dropsy*, *The Bible Reader* and *Grocer Woman*.

Dow, NEAL (1804-1897), an American temperance reformer, born in Portland, Me., of Quaker parentage. He served twice as mayor of Portland, one term as assemblyman and enlisted in the Union army during the Civil War. He was promoted to be brigadier general. After the war he devoted himself to the temperance cause and was the candidate of the national Prohibition party for president in 1880. He lectured in all parts of the United States, Canada and Great Britain with great success.

Dowden, EDWARD (1843-1913), an English critic and scholar, born in Cork, Ireland, and educated at Trinity College, Dublin. He held successively the positions of professor of oratory and professor of English literature in Trinity College. His *Shakspeare: His Mind and Art*, *Shakspeare Primer*, *Introduction to Shakspeare*, with editions of the *Sonnets* and of *Hamlet* and *Romeo and Juliet*, placed him among the foremost Shakespearian scholars. He also wrote, among other things, excellent critical works on Shelley and Wordsworth and a history of French literature.

Dow'el, a pin of wood or iron used to hold together boards, stones or other parts of a structure. The parts so fastened are said to be doweled, and a joint containing dowels is called a dowel joint.

Dowie, JOHN ALEXANDER (1847-1907), an American religious leader and faith healer, born

Downing

at Edinburgh, Scotland. He was admitted to the ministry and was pastor of two churches in Sydney, Australia, but later devoted himself to evangelism, traveling in England and America. He finally settled in Chicago in 1890 and soon afterward organized the Christian Catholic Church, with headquarters at Zion, about 35 miles north of Chicago. There he established a publishing house, a bank, a college, many charitable institutions, candy and lace factories and other industries, over all of which, as well as the conduct of his followers, he was dictator. In 1903 a tabernacle was erected at Zion, said to be one of the largest churches in the world. In 1901 Dowie announced himself to be Elijah the Restorer and made plans to extend the influence of Zion's church throughout the world. In 1906, however, a revolt among his followers led to his deposal from the position of authority and leadership.

Down'ing, ANDREW JACKSON (1815-1852), an American landscape gardener and nurseryman, born at Newburgh, N. Y. He laid out the grounds about the National Capitol, the White House and the Smithsonian Institution at Washington, D. C. His influence on American horticultural progress was very great. Among his contributions to the literature on horticulture are *Fruits and Fruit Trees of America*, *Treatise on the Theory and Practice of Landscape Gardening* and many essays.

Doyle, ARTHUR CONAN, Sir (1859-), an English novelist. He studied at Stonyhurst and Edinburgh, and from 1882 to 1890 he practiced medicine at Southsea. The success of some early attempts at fiction led him to give up his profession for a literary career, and he has written a great number of very popular books. In 1887 appeared *A Study in Scarlet*, made famous at once by the detective Sherlock Holmes, whom he introduced also into *The Sign of the Four*, *The Adventures of Sherlock Holmes*, *The Memoirs of Sherlock Holmes* and *The Hound of the Baskervilles*. Among his other books are the historical novels *Micah Clarke* and *The White Company*; the volumes of short stories *Round the Red Lamp* and *The Stark Munro Letters*, and *The Great Boer War*. He was knighted in 1902, as a reward for his services during that war and for his defense of the British policy.

Drachma, *drak'ma*, a unit of weight and of money among the ancient Greeks; also, the name of their principal coin, made of silver and worth about 19 cents. As a unit of weight it varied from 56 to 97 grains troy. The same

Drafting

name is given to a modern Greek coin, exactly equal to the French franc and, approximately, to 19 cents. It is divided into 100 *lepta*. The *drachma*, *dram* or *drachm* is the unit of weight in Greece, being exactly equal to the metric *gram*. The same term is applied to a unit of apothecaries' weight, equal to 3 scruples, or 60 grains.

Dra'co, an Athenian statesman who flourished about 624 B. C. When the citizens of Athens became dissatisfied because they had no written laws to which they could appeal against unjust judgments, Draco was appointed to draw up such a code. These first written laws were so merciless that they were said to have been written in blood. Almost every offense was punishable



CONAN DOYLE

by death. The laws of Draco were replaced later by the constitution of Solon. See **SOLON**.

Draft'ing or **Conscrip'tion**, the common name given to the enlisting of men in an army under compulsion. It was first used in Rome, a certain number of men being added to the army each year by conscription. In most European countries every man who is physically capable is compelled to serve for a time in the army. During the Civil War the Northern government was compelled several times to gain recruits by conscription, the most important act for that purpose being passed in March, 1863, and resulting in serious riots in New York City, which were only put down by firm and prompt action on the part of the state and Federal governments. The

Dragon

system was also used in the South during the Civil War.

Drag'on, a name for several species of lizards inhabiting Asia, Africa and South America. The common *flying lizard*, the best type of the genus, is about ten or twelve inches in length, the tail being extremely long in proportion to the body. The sides of the animal are furnished with peculiar extensions of the skin, which form a kind of wings and help to support the dragon in the air when it springs from branch to branch. Its food consists almost exclusively of insects.

Dragons, in mythology, were fierce, winged beasts like huge lizards, breathing fire and preying on human beings.

Drag'onet, the name of a family of small fishes, inhabiting the shores of warm seas. They have rather long, scaly bodies and are peculiar in having the gill openings reduced to a small hole on each side of the nape. The male and female are very different in color. In some species the males have the fins produced into spines and connecting membranes, which are highly colored. There are several species known, among which are one in Great Britain and one in the waters of Japan.

Dragon Fly, a family of beautiful insects, with large, long, gauze-like wings, that give it



DRAGON FLY

powerful and rapid flight. The dragon fly lays its eggs in the water, where the larvae and pupae live on aquatic insects. The larval stage lasts for a year. The pupae are always hungry. They propel themselves through the water by drawing it into their bodies and throwing it out again. In the United States the dragon fly is known as the *devil's darning needle*, and is the subject of some childish superstitions, but the dragon flies are harmless insects, and not even the butterflies can eclipse them in beauty of color or gracefulness of motion.

Dragon Tree, a rare, tree-like plant of the lily family, with a stem simple or divided at the

Drainage

top and in old age often much branched. The trunk is very thick in proportion to its height. One famous tree at Teneriffe was seventy feet high and forty-five feet in circumference. When Humboldt saw the tree it was hollowed out and used by the natives as a sanctuary. The dragon tree is a native of the Canaries and yields a resin known as dragon's blood, though the dragon's blood of commerce comes principally from other trees.

Drain'age, a method of withdrawing the water from the soil by means of channels, which are generally covered. Wet lands are made more productive, swamps and marshes are reclaimed and unhealthful surroundings are made sanitary by drainage. Successful drainage in a great measure depends on a proper knowledge of the situation and the porosity and character of the various strata of the soil. Some strata allow water to pass through them, while others force it to run or filtrate along their surfaces till it reaches a lower level. In general, where the grounds are in a great measure flat and the soils retain the excess of moisture, they require artificial drainage to render them capable of yielding good crops, whether of grain or grass. The wetness of land, which makes it inferior for agricultural purposes, may appear not only as surface water, but as water which flows through the lower strata, and in consequence both surface-draining and under-draining are at times necessary. Open ditches carry off the surface water, but they also carry off much of the best soil, so they are not generally used where other methods are available. Stone or tile drains lying four or five feet below the surface are the best medium for agricultural lands. Stone drains are either formed on the plan of open culverts of various forms, or of small stones in sufficient quantity to permit a free and speedy filtration of the water through them. The box drain, for instance, is formed of flat stones neatly arranged in the bottom of the trench, the whole forming an open tube. In tile drains, tiles or pipes of burnt clay form the conduits. They possess all the qualities which are required in the formation of drains, affording a free ingress to water, while they effectually exclude vermin, earth and other injurious substances. Drainage tiles and pipes have been made in a great variety of forms, the earliest of which, since the introduction of thorough draining, was the horseshoe tile, so called from its shape. These should always rest on soles, or flats, of burned clay. Pipe tiles, which combine the sole and cover in one piece, have been

Drainage Canal

made of various shapes, but the best form appears to be the cylinder.

Sometimes, by placing a few simple drains in the proper places near the sources of springs, swamps of great extent may be quickly dried, while surface drainage of the swamp would be very expensive and only partly successful. In many states of the United States laws provide for the reclamation of swamp land, partly at the expense of the county in which they are located. In the laying out of drains, the first point to be determined is the place of outfall, which must necessarily be at the lowest point of the land to be drained. The next point to be determined is the position of the minor drains. In the laying out of these, the surface of each field must be regarded as being made up of one or more planes, for each of which the drains should be laid out separately, so that they will run in the line of the greatest slope, no matter how distorted the surface of the field may be. All the minor drains should be made to discharge into mains or submains, and not directly into an open ditch or water course. As a general rule, there should be a main to receive the waters of the minor drains from every five acres.

Drainage Canal, CHICAGO, a canal connecting the south branch of the Chicago River with the Desplaines River at Lockport, Ill. This canal was begun September 3, 1892, and was completed in January, 1900. It is a little over 28 miles long and from 30 to 36 feet deep; its width at the bottom in rock sections is 150 feet, and in earth sections from 110 to 202 feet, and at the top it is from 200 to 300 feet wide. The depth of water is never less than 22 feet, and the average flow is 300,000 cubic feet a minute, though its capacity is 600,000 cubic feet. The controlling works at Lockport consist of flood gates, a beartrap dam and a tail-race 6500 feet long.

The Chicago Drainage Canal was constructed for the purpose of turning the sewage of Chicago into the Illinois River. Previous to its construction the sewage had flowed into Lake Michigan, from which the city obtains its water supply. It is considered one of the greatest engineering feats of the century. By its construction the Chicago River, which flowed into Lake Michigan, had its direction reversed, and a powerful current from the lake was sent through its channel to the Illinois River and thence to the Mississippi. The channel is large enough to carry boats drawing 22 feet of water, and with

Drake

the necessary improvements in the Illinois and Mississippi rivers, the canal will serve the double purpose of drainage and transportation.

Drainage Tubes are used in surgery to conduct pus or matter away from an abscess when a free incision cannot be safely or conveniently made. They are usually made of india rubber or caoutchouc and are introduced into the abscess or wound so that one end is in contact with the seat of discharge, while the other reaches to the surface of the skin.

Drake, FRANCIS, Sir (1540-1596), an English navigator, born in Devonshire. He served as a sailor in a coasting vessel and afterward joined Sir John Hawkins in his last expedition against the Spaniards (1567), losing nearly all he possessed in that unfortunate enterprise. On the most famous of his voyages Drake passed the Straits of Magellan, plundered the coasts of Chile and Peru, sacked several ports and captured a Spanish galleon laden with silver, gold and jewels to the value of perhaps \$1,000,000. He then ran north, seeking a passage to the Atlantic, but was compelled to abandon this scheme. He then steered for the Moluccas, crossed the Indian Ocean, doubled the Cape of Good Hope and arrived at Plymouth, Nov. 3, 1580, being the first Englishman to circumnavigate the globe.

Drake, drak'ke, FRIEDRICH JOHANN HEINRICH (1805-1882), a celebrated German sculptor, born at Pymont. At a very early age he showed an inclination for art, and through a friend he gained admission to the studio of the sculptor Rauch, whose influence is shown in almost all of Drake's works. His most important work, a colossal bronze statue of King William of Prussia, which was made for the iron bridge of Cologne and was exhibited at the Paris Exposition of 1867, is generally regarded as one of the greatest works of modern sculpture. Among his earlier works worthy of mention are *A Dying Warrior*, *A Madonna and Child*, *A Warrior Crowned by Victory* and *A Female Vine-Dresser*. He also executed some important busts and statuettes, which include those of Goethe, Schiller, Humboldt and Rauch.

Drake, drake, JOSEPH RODMAN (1795-1820), an American poet. His youth in New York was a hard struggle, but he managed to take a course in medicine and graduated in 1816. In the same year he married a young woman with money, and two years later he went with her to Europe. Returning to the United States, he went to New Orleans for his health, but received no help and died of consumption in

1820. In his literary work he was closely connected with Fitz-Greene Halleck, who wrote a eulogy on him. His best remembered poems are the ode to *The American Flag*, and *The Culpit Fay*, which was popular in its time.

Drakensberg, *drah'kens berg*, a range of mountains in South Africa, forming the western frontier of Natal. The highest peak has been estimated at 12,000 feet. Many battles were fought in this region during the wars between the Boers and the English.

Dra'ma (from the Greek word meaning *action*), a prose or poetic work, usually intended to be acted on the stage, in which, by conversation, action and set scenery, incidents and characters are presented in a striking manner. Its two great branches are tragedy and comedy, the former, roughly speaking, melancholy in character, the latter cheerful. The origin of the drama must be sought for in the love of imitation, and dramatic performances of some kind are to be met with probably among all nations. Dramatic compositions are found in the Old Testament, for example, in Job and the Song of Solomon; and ancient India and China both developed a dramatic literature of their own.

The European drama had its origin in Greece, and here both forms, tragedy and comedy, took their rise in the celebrations of the festivals of Bacchus. At these festivals, hymns and chants, either sorrowful or gay in tone, were sung by choruses in honor of the gods, and the chorus continued to be a prominent feature of the old Greek drama. A distinguishing mark of the Greek drama was its adherence to what was known as the unities of time, of place and of action. That is, the events of the play must not extend over more than one day; any change of scene must be slight, no more than what could actually be accomplished in the length of time represented, and all the incidents must bear closely on the one central plot. Modern dramatists have, as a rule, in order to increase the possibilities of their art, neglected the unities of time and place; and the introduction of a stage curtain and of elaborate scenery, unknown to the Greeks, has made possible a freedom unknown to the primitive theater. Even in regard to the unity of action, still recognized as important, much greater latitude is now allowed, and secondary plots are often introduced. The invention of tragedy is generally ascribed to Thespis (about 550 B. C.); but the true creator of tragedy was Aeschylus. Thespis

had only one actor, who from time to time relieved the chorus by declamation; Aeschylus changed this representation into real action by making use of two actors in addition to the chorus. He also introduced masks; and by means of a long gown and the *cothurnus*, or buskin, the lofty stature of the heroes was imitated. A third actor was first introduced by Sophocles. Other changes also took place. The chorus, fifty in number, was divided into four groups, and plays were presented in groups of four, founded upon some one legend. Greek tragedy, at the time of its chief representatives, Aeschylus, Sophocles and Euripides, was rather a religious function than an entertainment. Not only moral, but religious, purposes were evident, and a fear of the justice of the gods was taught by the presentation of the punishment which followed an evil action. Comedy developed side by side with tragedy, but it never attained an equal importance. Largely political in its origin, it held up to ridicule the most prominent men of the day; and from this phase it passed to the ridicule of the foibles of humanity as a whole. The chorus was dropped from the comedy early in its history. The most important name in connection with Greek comedy is Aristophanes.

The regular drama among the Romans was borrowed from the Greeks. Plautus and Terence were imitators of the Greek comedy, and it is from their translations, rather than from the originals, that we are acquainted with the work of the later Greek writers of comedy. The most important remains of Roman tragedy are the ten dramas accredited to Seneca, which were intended for reading rather than for acting.

In most modern European countries the regular drama took its rise in the mysteries, miracle plays and moralities of the Middle Ages (See MYSTERIES). In Italy, however, it began with a reproduction in Latin of classical models. The earliest tragedy in Italian is Trissino's *Sofonisba* (1515). Regular comedies in Italian were written by Ariosto, Aretino, Macchiavelli and others; and to the same period (fifteenth and sixteenth centuries) belongs the Italian pastoral drama, which sprang from the ancient idylls and aimed at a fanciful delineation of Arcadian and mythological scenes. Among the pastoral dramatists of this period are Poliziano, Tasso and Guarini. The pastorals gave birth to the opera, early masters of which, so far as it may be included in the poetic drama, are Zeno and Metastasio. The Italian drama

waned in the seventeenth century, but in the eighteenth century genuine comedy and classic tragedy were restored, the former by Goldoni, the latter by Alfieri. Monti, Manzoni and Niccolini are among the later writers of tragedy, while of recent years D'Annunzio has won fame as a playwright.

The other European nations cultivated the dramatic art much later than the Italians. The English and Spaniards devoted their attention to it almost at the same time; the former reaching their acme in Shakespeare, the latter in Lope de Vega and Calderon. The first English comedy, *Ralph Roister Doister*, was published before 1551, while the first tragedy, *Gorboduc*, or *Ferrex and Porrex*, appeared some years later. The history of the English theater and drama is divided into two parts, the first of which begins with the reign of Elizabeth and ends with the reign of Charles I. The rapid development of the drama during the reign of Elizabeth was entirely unhampered by foreign influence. Lyly, Peele, Greene, Marlowe, Shakespeare, Ben Jonson, Beaumont and Fletcher, Chapman, Webster, Middleton, Marston, Ford and Massinger are among the chief names connected with this brilliant period of the English drama. During the Commonwealth the Puritans prohibited all kinds of plays, and the theaters were shut up for thirteen years. With Charles II the drama reappeared and exhibited a licentiousness hardly equaled by that of any other Christian nation. Among the chief names belonging to this period are Dryden, Otway, Lee, Shadwell and Wycherley. From the close of the seventeenth to the end of the eighteenth century, British comedy was cultivated with much success by Cibber, Farquhar, Congreve and others. As most noteworthy among the dramas of this period, however, must be mentioned Addison's *Cato*, Goldsmith's *She Stoops to Conquer* and Sheridan's *The Rivals* and *The School for Scandal*. Some of the famous poets of the nineteenth century, notably Browning, Tennyson and Swinburne, have written dramas, but much of their work is not well adapted for acting. The knowledge of what may be effectively presented on the stage has become clearer in recent years, and most modern plays are written with a view to their dramatic rather than to their literary value.

The French drama was in a miserable state before Corneille (1606-1684), who indeed is looked on as the founder of the drama in France. Racine, Molière, Voltaire, and in later times

Hugo, are some of the other distinguished French dramatists. Since about 1820 a new dramatic school has been formed in France, which, departing from the ancient strictness of what is called the classic, approaches more and more to the German or British, or what is called the romantic school. The establishment of this school formed part of the general reaction against the excessive adherence to classic models in literature, the leader in the movement being Victor Hugo. Among the modern French dramatists may be mentioned Alfred de Vigny, Alfred de Musset, Mérimée, Scribe, Dumas the Younger, Sardou and Edmond Rostand.

The German drama is of later birth than any we have mentioned, and for a long time the Germans contented themselves with translations and adaptations from the French. Lessing was the first who, by word and deed, broke the French sway, and he was succeeded by Schiller and Goethe, who rank as the greatest of the modern dramatists. Prominent names in the German drama are Kotzebue, Körner, Schlegel, Tieck, Brentano, Grillparzer, Hebbel, Ludwig, Gutzkow, Freytag, Sudermann and Hauptmann. Ibsen and Björnson are the chief names connected with the Scandinavian drama, while Belgium is represented by the symbolist Maeterlinck. In America, owing to the fact that for a long time any European play might be produced without change, playwriting received little stimulus. The passage of an international copyright law changed matters, and many good plays have been produced, although few if any of them can be called great plays. The history of the drama in America has not been unimportant, notwithstanding the scarcity of plays, because actors of note have been more numerous than playwrights, and they have contributed largely to the development of the drama.

The various classes of drama—tragedy, comedy, opera, pastoral, burlesque and farce—are noticed under their proper headings. See also the articles on the important authors mentioned above, and on famous actors.

Dra'per, ANDREW SLOAN (1848-1913), an American educator, born at Westford, New York. He first won distinction in the New York legislature and was appointed by President Arthur one of the judges of the Alabama claims. In 1886 he was elected superintendent of public instruction of New York and retained the position for six years, when he became a superintendent of schools in Cleveland, Ohio. In 1894 he was elected president of the University of

Illinois, and in 1904 he was chosen commissioner of education for the State of New York. He is the author of *American Schools and American Citizenship*, *American Universities and the National Life*, *The Rescue of Cuba* and numerous articles in leading periodicals.

Draper, JOHN CHRISTOPHER (1835-1885), an American physician who practiced in the city of New York and is known by his writings on medical and scientific subjects. He was at different times professor of chemistry or natural science in New York University and the College of the City of New York. He was also editor of the *Yearbook of Nature and Science* and had charge of the department of natural science in *Scribner's Monthly*. Among his important works are *A Text-book on Anatomy, Physiology and Hygiene* and *A Text-book of Medical Physics*.

Draper, JOHN WILLIAM (1811-1882), famous as chemist and physiologist, but better known to the public as the author of philosophical histories. He was born in England, but came with relatives to America and took his degree of medicine at the University of Pennsylvania. He was one of the founders of the medical school of New York University. His discoveries in the chemical qualities of light led to great practical advances in photography, and to him should be given the credit for making the first photograph of the human face, in 1839. He wrote the *History of the American Civil War* and *The History of the Intellectual Development of Europe* (2 volumes). His most popular work is *History of the Conflict between Science and Religion*.

Draughts, drafts. See CHECKERS.

Drave, a European river which rises in Tyrol, flows across the north of Illyria and the south of Styria, between Hungary on the left and Croatia and Slavonia on the right, and joins the Danube 14 miles east of Essek. Its chief affluent is the Mur. It is about 450 miles long and is navigable for about 350 miles.

Dravid'ian, a term applied to the vernacular tongues of the great majority of the inhabitants of southern India and to the people themselves, who must have inhabited India previous to the advent of the Aryans. The Dravidian languages are generally considered to belong to the Turanian class.

Draw'bridge. See BRIDGE, subhead *Draw-bridges*.

Draw'ing is the art of representing upon a flat surface the forms of objects and their positions and relations to one another, though origi-

nally the term meant delineation, or representation by means of lines. The idea of nearness or distance is given by the aid of perspective, foreshortening and gradation. The term drawing, in its strict sense, is only applicable to representing forms of objects in outline, with the shading, or *modeling*, necessary to develop roundness. But the term is still used in its original sense, and the drawing of a draughtsman does not produce a picture of a machine or structure of any kind, but a diagram by means of which the object can be constructed. In like manner the architect does not make a picture of the outline of the house, but a diagram of the plan, and such a drawing is called a *mechanical drawing*. Drawing, in its restricted sense, may be considered of three kinds, *pen drawing*, *chalk drawing* and *drawing shaded with the brush or hair pencils*. *Pen drawings* are often confined to pure outlines, an appearance of *relief* or projection being given by thickening or doubling the lines on the shadow side. Finished pen drawings have all the shading produced by combinations of lines, called *hatching*. *Chalk drawings* (including lead pencil drawings) are best suited to beginners, as errors can be easily corrected. Black, red and white chalks are used. When the chalk is powdered and rubbed in with a stump, large masses and broad effects can be produced with much rapidity. A combination of hatching and stumping is generally preferable to adhering exclusively to either mode. *Drawings shaded with the brush* are outlined with the pencil or pen, the shading being laid on or washed in with the brush in tints of India ink, sepia or color. A *sketch* is a drawing in which the artist records the chief features of an object or scene. The choice of what to show and what to omit calls for a high artistic taste, and the sketch of a master is worth infinitely more than the highly finished drawing of an inexperienced hand.

The great schools of painting differ from one another as much in their drawings as in their painting. In Italy the Roman school, through Raphael's fine sense of the beautiful and expressive in form, and through his study of the antique, became the true teacher of beautiful drawing. The Florentine school tried to surpass the Roman precisely in this particular, but it lost by exaggeration what it had gained by learning and a close study of anatomy. In the Lombard school a tender style of drawing is seen through harmonious coloring, and in the Venetian school the drawing is often veiled in the richness of the color. The Dutch school excels in a careful and

Drawing

minute style of naturalistic drawing, combined with great excellence in coloring. The French school in the time of Poussin was very accurate in its drawing; at a later period its style betrayed a great amount of mannerism. David introduced again a purer taste in drawing and a close study of the antique, and these are qualities which distinguish his so-called classical school from the romantic and eclectic schools of a later period. The modern German masters have a style all of their own, acquired by independent study of nature, while the drawings of the British school are naturalistic, though of late they have become more accurate and expressive.

Representation of form is the basis of all plastic arts and hence drawing is the most important branch of study in art. Since the study of it exercises the faculties of observation and memory, develops muscle control in the form of skill and trains the hand and eye in intelligent coöperation, drawing has come to be recognized as of a special educational value and has therefore been introduced into the regular course of study in the public schools of nearly all countries. In the delineation of an object which is present before the eye there are necessarily three things involved: (1) observation, in which is included attention and perception; (2) memory, or the retention in the mind of the impressions of the object obtained by means of the eye, while the eye is withdrawn from the object to the drawing on the paper, and (3) the coöperation of the hand and eye. The aim of the teacher in the primary grade is to bring out the imaginative faculty of the child, and this is done by such work as weaving and modeling, in which the child becomes acquainted with common forms. Later on, the pupil learns to cultivate his powers of observation and to acquire skill in manual art by means of the varied exercises in drawing from simple objects of nature or from models of exact geometrical forms. The former is generally regarded as the more valuable, because they are things with which the pupil comes in daily contact and which are especially interesting because of their attractiveness. As the pupil advances, the objects become more complex. In the higher grades, casts, living models and other more difficult objects are used, whereby the pupil's powers of artistic expression are called forth. He is taught the proper method of procedure and learns the correct use of construction lines and blocking-in lines and various other principles. The work is done in charcoal, India ink, crayon or other media.

Draw Poker

Mechanical drawing is also taught and furnishes an excellent drill in mental discipline. The pupil acquires the power of accurate observation, manual dexterity and precision of eye measurements, all of which are of great value in the common affairs of life, as well as in the study of art. Among the helpful works on the subject of drawing are Ausburg's *Drawing Books, One and Three*; Prang's *Course in Drawing for Graded Schools, Teachers' Manual*; Prang's *Drawing for Ungraded Schools, Manual*; also "Drawing in the Public Schools," *Report of the United States Bureau of Education*, and Tadd's *New Methods in Education*.

Draw Pok'er, a game of cards which is said to have originated in the United States and is the most popular gambling game of this country. It is played with the full pack of fifty-two cards and by any number of people, though the best game is played by from four to six persons. The score is kept with round, flat pieces of bone or ivory, which are known as *chips*. These are of different colors, and a distinct value is assigned to each color. Before beginning the game, these chips are distributed equally between the players. Five cards are dealt to each. The person to the left of the dealer places one or more chips upon the table. This is known as the *ante* and makes it certain that every player will take part in the game whenever the deal is at his right. When the cards have been dealt they are examined, and each player decides whether he will join in the game or not. If so, he puts two or more chips, as has been agreed upon, in the center and turns face down upon the table as many of his cards as he does not wish to use. When all the players have determined whether they will join in the game or not, the dealer gives to each player as many cards as he has discarded, so that each hand will contain five cards. The person to the left of the one who *antes* now bets whatever he wishes, by placing the required number of chips on the table. If no one equals this play, he takes all the chips that are on the table. If any player puts in an equal number he has a right to see the hand of the bettor, after which the higher hand takes the chips on the table. If any player wishes, he may, at any time after the first has bet, raise the bet by putting in more chips, in which case the other players in rotation have a right to equal or exceed his bet. In the latter case the play proceeds until all have bet an equal amount, or until only one player is left with more than the others. If all have an equal

amount, the hands are exposed and the highest one takes the chips. *Bluffing* is betting high on a weak hand, so as to make one's opponents fear to go in and in consequence lose their chips. The value of the hands, beginning with the lowest, is *one pair*, which means two of a kind, with three other cards of different denomination; *two pairs*, with one card of different denomination; *three of a kind*; a *straight*, which consists of five cards in sequence, not of the same suit; a *flush*, five cards of the same suit, not in sequence; a *full*, *full house* or *full hand*, three cards of the same denomination and a pair; *four of a kind*; a *straight flush*, five cards of the same suit in sequence; and a *royal flush*, which is a straight flush of the highest five cards in a suit.

Dray'ton, WILLIAM HENRY (1742-1779), an American Revolutionary patriot, born in South Carolina. He received his education in England, returning in 1764 after being admitted to the bar. He at first opposed the active patriots of the colonies and on this account was appointed privy chancellor of South Carolina and associate judge in 1774. In that year, however, after publishing anti-English pamphlets, he was removed and made president of the provincial congress of South Carolina by the patriots. He was the first chief justice of the state and became its president in 1777. The last year of his life he spent in the Continental Congress.

Dreams, *dreemz*, trains of ideas which present themselves to the mind during sleep. In dreaming there is no voluntary control over the current of thought, and the principle of suggestion has unlimited sway. Usually there is no coherence in the images that appear, but the most extraordinary contradictions excite no surprise in the dreamer. Occasionally, however, intellectual efforts are made during sleep that would be difficult to surpass in a waking state. It is said that Coleridge composed *Kubla Khan*, a beautiful fragment of a poem, while asleep, and similar actions have been recorded of other men. Dreams arise from very natural causes and are merely the result of mental processes, stimulated as are our thoughts during the daytime. A sensation of cold may cause one to dream of snowstorms and freezing; a ray of light may incite a dream of fire, or the action of an undigested meal may bring a train of horrible imaginings. Dreams may in a general way indicate the condition of a person's health and are the frequent accompaniment of some forms of disease.

Dredging, *drej'ing*, the process of removing mud, sand and other obstructions from the bottom of a body of water. Dredging is usually employed for the purpose of deepening harbors and removing obstructions to navigation. The form of dredge in most common use in the United States is that known as the *dipper* dredge. In its construction and working it very closely resembles a steam shovel, except that it is mounted on a barge, instead of on a car (See STEAM SHOVEL). The dipper holds from five to eight cubic yards and is emptied into a barge, which is held in position alongside the dredge. Several patterns of dipper are used. One for removing loose stones is in the form of a clam-shell, hinged at the back. Another, known as the *grapple* dredge, opens and closes around the earth or stones to be lifted and is of advantage where a direct vertical motion is necessary. Another form of dredge useful in soft bottoms consists of a series of buckets, fastened to an endless chain, which is supported in such a manner that it can be raised and lowered to enable the buckets to scoop up the silt from the bottom.

Dred Scott Decision, a decision of the United States Supreme Court, delivered by Chief Justice Taney, March 6, 1857, in which important questions concerning slavery were decided. The plaintiff, Dred Scott, was a slave in Missouri; his owner took him to Illinois, a free state, then to Minnesota, a free territory by the Missouri Compromise, and finally back to Missouri, a slave state. The plea of Scott was that his residence in Illinois and Minnesota made him a free man. The Supreme Court of Missouri decided against him, and the United States Supreme Court upheld this decision. It decided that Scott was not a citizen; and in additional statements declared that a negro was not considered in American law to be a man, but a chattel, "without rights or privileges except such as those who held the power and the government might choose to grant him." The decision practically admitted slavery to every territory in the Union. It aroused intense indignation in the North and was one of the important incidents that led to the Civil War. See UNITED STATES, subhead *History*.

Dreibund, *dri'boont*, THE. See TRIPLE ALLIANCE.

Dresden, *drez'den*, the capital of the kingdom of Saxony, on the river Elbe, 111 mi. s. of Berlin. Among the chief edifices, besides several of the churches, are the Museum, in the northeast wing

of the building called the Zwinger, a beautiful structure containing a famous picture gallery and other treasures; the Japanese Palace, or Augusteum, containing the royal library of from 300,000 to 400,000 volumes, besides a rich collection of manuscripts; the Johanneum, containing the collection of porcelain and the historical museum, with a valuable collection of arms, armor and domestic utensils, belonging to the Middle Ages. The royal palace is unattractive externally, but it has a fine interior. It contains a valuable collection of curiosities, jewels, trinkets and works of art. The court theater is one of the finest structures of the kind in the world. The city is distinguished for its excellent educational, literary and artistic institutions, among which are the Polytechnic School, much on the plan and scale of a university; the conservatory and school of music and the Academy of Fine Arts. The manufactures are not unimportant and are various in character; the china, however, for which the city is famed, is made chiefly at Meissen, fourteen miles distant.

The chief glory of Dresden is the gallery of pictures, one of the finest in the world, which first became of importance under Augustus II, king of Poland and elector of Saxony, but which owes its most valuable treasures to Augustus III, who purchased the greater portion of the gallery of the Duke of Modena for \$900,000. The pictures number about 25,000. Besides this fine collection, the museum contains also engravings and drawings amounting to upwards of 350,000. Dresden, being thus rich in treasures of art and being favored by a beautiful natural situation, is the summer resort of many foreigners. It suffered severely in the 'Thirty Years' War and also in 1813, when it was the headquarters of Napoleon's army. It was occupied by the Prussians in 1866, but was evacuated in the following spring. Population in 1910, 546,882.

Dresden, BATTLE OF, a battle fought in 1813, between the French, under Napoleon, and the allied Austrians, Russians and Prussians, under Schwarzenberg. Napoleon had come to the relief of Dresden, which was occupied by the French. The allies assaulted and bombarded the city, and soon after a great pitched battle was fought (August 27), the allies being defeated.

Dresden China, a delicate, highly finished China, made at the royal factory at Meissen, near Dresden, in Saxony. It was first made in 1709, when Johann Friedrich Böttger, chemist to the elector of Saxony, discovered the necessary materials. The manufacture has continued to

the present day and includes pieces for decoration and all kinds of uses, and its designs are of great variety, in relief, in color and in gold. Vases, statuettes, groups of figures, candelabra, clocks and other articles are often made of Dresden china and are highly prized.

Dress or Costume, taken in a general sense, the clothing and ornaments of a person; especially, the established mode of dress peculiar to a nation or tribe of people. Our knowledge of the dress of the earliest peoples is obtained from rude sketches and sculptures and from myths and traditions. Sculptures found in Mesopotamia and Egypt, dating from 300 B. C., show a garment made of a large oblong piece of cloth, carried over the left shoulder and under the right arm, the two edges overlapping on the left side of the body and the left leg. This garment seems to have been commonly used among men and women of high position. Other persons wore only a piece of cloth hanging from a waist belt over the thighs. The Assyrians, who were skilled in dyeing, weaving and embroidering, came to be celebrated for the richness of their attire. It was characteristic of the ancient Greeks that they wore very simple and graceful costumes. In earliest times the dress of the men consisted of a *himation* or *chlamys* only, a garment worn open on one side; later a *chiton*, a close-fitting, sleeveless shirt, reaching below the knees, was worn under the *himation*. The women wore a loose *chiton* of fine linen, reaching to the feet and confined below the bust by a girdle. Sometimes a woolen shawl, called a *peplos*, was draped over the *chiton*. The costume of the ancient Romans was similar to that of the Greeks. They had one characteristic garment, the *toga*, a large, loose cloak, under which was a *chiton*, called a *tunic*. The only other garment was a sandal worn to protect the foot.

We have no record of the time when the Chinese were not clothed in accord with their rank and station. Their dress to-day is practically the same as it was in the oldest times of which we have any knowledge. Those who have drudgery to perform may go almost naked, but, ascending in the order of rank, clothing becomes more complete and costly. A loose, blue blouse of silk or cotton, fitting closely around the neck, and short, wide trousers are the principal garments. The women's dress differs from that of the men in headdress and foot gear. In Japan the ordinary costume of both sexes consists of a number of loose, wide gowns, worn over one another and held in place by a sash. The sleeves

are very long and wide. People of high rank wear costly silks and have a family crest embroidered on the back and breast of the outer garment. European dress, however, is becoming common among the Japanese. In India the principal garment is usually a piece of cotton, linen or silk, about four feet wide by twelve feet long, carelessly wrapped around the body. Women now generally wear a petticoat under this garment. The arms and legs are bare, except when covered by jewels.

When the Romans invaded northern Europe the attire of the barbarian chiefs consisted of striped pantaloons and a shirt having sleeves. The women wore simple, loose gowns, usually of wool, with sleeves and girdle. In the Middle Ages the nobles and knights were so constantly engaged in fighting that the most important feature of their attire was necessarily the armor. Both men and women wore cloaks so long that all other details of the costume were concealed. There was never much of a tendency among any ancient people, except the Chinese, to try to fit the clothing to the figure, but near the end of the Middle Ages garments came into fashion which required careful cutting and fitting and much sewing. The dress for women was close-fitting about the bust, waist and hips and gored so as to be very loose and full in the skirts. That for men consisted of a tight-fitting coat, called a *doublet*, laced or buttoned close to the body, and long, snug-fitting stockings. The costumes of the last years of the sixteenth century were marked by excessive extravagance and elaborateness of design, color and material. In modern times the most graceful and artistic costume for men is perhaps that worn in the age of Louis XIV of France. It consisted of short trousers and loose doublet, reaching a little below the waist and generally worn unbuttoned so as to show the soft, full shirt front; a short cloak, usually worn on the left shoulder; a broad, soft, lace-trimmed collar and a wide felt hat with a soft, drooping feather. The women of this period wore a low-cut, easy-fitting bodice with ruffled elbow sleeves.

There was a general tendency to simplicity after the French Revolution, and from the dresses worn at this time all our modern fashions have followed. Styles vary from year to year and from season to season in the cities of Europe and of America. It is only in remote country places in Europe that any of the old-time costumes are now worn. For instance, the Highland Scot still wears his belted plaid, and the

Tyrolean mountaineer his short breeches, green blouse, conical hat and picturesque cloak. In North America the Eskimo wears a hood, short trousers and boots of fur and feathers, a costume similar to that of the earliest Eskimos of whom we have any record. The American Indian in many places wears only a loin cloth and blanket, such as the early redmen wore, but, barring these and a few other exceptions, **no one** style of dress has been common in Europe and North America during the past two centuries. The same general articles of dress have been worn, but the color, shape and trimmings of these garments have varied according to the dictates of fashion, **which** is governed by the influential classes, and **is** quite uniform each season throughout Europe and America. Modern dress, however, is not absolutely dependent on the changes of fashion, as there is a tendency toward dress reform in regard to women's clothing. The general interest of women in out-of-door exercise and the need for clothing which gives freedom of movement has an influence on their dress.

Drew, DANIEL (1788-1879), an American capitalist and philanthropist, born in Carmel, N. Y., where he was first employed as a cattle drover and dealer. Later he became interested in steamship lines and railroads, for a time in partnership with Cornelius Vanderbilt. He also founded the banking firm of Drew, Robinson & Co., which became one of the best-known stock brokerage concerns in the country. Drew later suffered losses through the failure of Kenyon, Cox & Co., in which firm he was a partner, and was forced into bankruptcy. Previously, however, he had given liberally to the Methodist Church and allied institutions, and in 1866 he had founded Drew Theological Seminary at Madison, N. J.

Drew, JOHN (1853-), an American actor, son of John Drew, Sr., and Louisa Drew, both actors of some note. At his mother's theater in Philadelphia he made his first appearance, and three years later he went to New York, where in the years which followed he took various parts under Edwin Booth, Fanny Davenport and other stars. From 1875 to 1892 he was connected with Augustin Daly's company, of which he was for years the leading comedian, winning great popularity as Petruchio in the *Taming of the Shrew* and as Charles Surface in *A School for Scandal*. In 1892 Mr. Drew began starring on his own account and has since produced very successfully a number of plays, among which are *A Marriage of Convenience*, *The Liars*

Drexel

Richard Carvel and The Duke of Killiecrankie.

Drex'el, ANTHONY JOSEPH (1826-1893), an American banker and philanthropist, born in Philadelphia. He was the head of the firm of Drexel & Co., Philadelphia, having been identified with it since the age of thirteen. He was a liberal patron of science and art, especially music. The Drexel Institute of Art, Science and Industry, Philadelphia, was established in 1891 by Mr. Drexel, with an endowment of \$2,000,000. He was also associated with his friend George W. Childs in the inception of the Childs-Drexel Home for Union Printers at Colorado Springs, Colo. See DREXEL INSTITUTE.

Drexel Institute of Art, Science and Industry, a coeducational institution founded in Philadelphia in 1891 by Anthony J. Drexel. The purpose of the institute is to provide instruction and training in the arts and sciences directly related to industries. It maintains courses in electrical engineering and fine and applied arts, commerce and finance, mechanical drawing and machine construction, domestic science, mathematics, physics, chemistry and English. Both day and evening classes are provided in all departments, and free public lectures are maintained. Admission is through examination or upon the diploma of an approved high school. The building and equipments exceed \$4,000,000 in value, and there is an endowment fund of \$2,000,000. The library numbers about 30,000 volumes, and the reading room is supplied with all the leading periodicals. The number of students in the day classes exceeds 1200, and in the evening classes, 2000.

Dreyfus, *dra'fus*, ALFRED (1859-), a French artillery officer, born in Upper Alsace, of Jewish parentage. He moved to Paris in 1874 and took up a course of study to prepare himself for his profession. In his studies and in his service in different regiments he proved himself most able, and in 1891 he was appointed to the general staff. Three years later, without warning, he was arrested on a charge of having sold military secrets to a foreign government. The court which tried him was a secret one, and although Dreyfus was allowed counsel, he was condemned on the most inadequate evidence and was sentenced to solitary imprisonment on Devil's Island. Over the entire world great indignation was aroused by his trial and by the severity with which he was treated during his imprisonment. Gradually the conviction became general that Dreyfus was innocent and

Drowning

had been the victim of a conspiracy. This conviction was strengthened by reliable testimony that Major Esterhazy, an officer of doubtful character, had written the memorandum known as the *bordereau*, an important document which had been produced against Dreyfus. The effects of the case were far-reaching. The reputations of high officials were ruined, the Brisson ministry resigned and great corruption was disclosed in the French army. Throughout the trial, and afterward, the most active defenders of Dreyfus were his brother, Matthieu Dreyfus, and Emile Zola, the novelist (See ZOLA, EMILE). At a second trial, in 1899, Dreyfus was again convicted, but on September 19, 1899, he was pardoned by President Loubet. Retiring to his country estates, he began a fight for vindication. This ended in complete success in July, 1906, when the Supreme Court of France acquitted him of the charge of any wrongdoing and rebuked his accusers. He was then made a major in the army and was enrolled in the Legion of Honor.

Drift, the name applied to deposits that were formed during the Glacial period. The matter composing drift was either carried or pushed along by the glaciers and left wherever they grounded, or where the lower end of the glacier melted. It usually forms compact, structureless deposits of varying thickness. It is known by the names of "boulder clay" and "older diluvium." The stones in drift are usually oblong or oval, are highly polished and have rounded edges. Some of the larger rocks contain *striae* which run parallel to their longer axis. See GLACIAL PERIOD; GLACIERS.

Dromedary, *drum'e da ry*, a light, fleet camel. The name is applied both to a variety of the Arabian camel and also to a variety of the Bactrian. It is used for travel and will cover about five hundred miles in six days. It can live on a very small amount of food and requires only short periods for rest. The jolting can be long endured only if one is used to it. See CAMEL.

Drown'ing means death by suffocation, the air being excluded from the lungs by a liquid. It is only necessary that the mouth and nostrils be immersed to cause death in this manner. It is probable that complete insensibility comes within one or two minutes after such immersion, but death does not ensue until from two to five minutes after, and cases have been known where persons recovered after having been under water a much longer time. As in other forms of asphyxiation, efforts to restore life to a patient

Drowning

should not be abandoned for a long time, even though no apparent signs of life exist. Instances are known where people have returned to life after hours of apparent death. In all attempts to resuscitate the drowned, prompt action is necessary, but excitement, confusion and haste are not only unnecessary but are really wasteful of time and energy. The rescuer should proceed after some such plan as the following, which was suggested by Dr. Benjamin Howard of New York:



DROMEDARY

Place the body on its face with a roll of clothing under the stomach, the head being supported on the hand. Pull the body over the roll of clothing, to expel the water from the chest; if necessary, press upon the back from the waist toward the shoulders. If the tongue closes the mouth, take it between the fingers, pull it forward and hold it downward. Cleanse the mouth and nostrils from sand or dirt, if they have entered. When the lungs are thoroughly emptied, turn the body on the back and support the shoulders. If the person is past breathing,

Druids

begin at once to stimulate artificial respiration, as described below. In the meantime, if other people are present they should rub the upper part of the body and the limbs vigorously and continuously to encourage circulation, and if the body is very cold, they should lay bottles of hot water about it; but remember that too much heat is dangerous.

Artificial breathing may be induced in the following manner: While the body is lying on its back, with the shoulders slightly raised,

knelt over it; place both hands on the lower part of the chest, so that the thumbs hook in under the lowest ribs and the fingers are spread out on the chest; steadily press forward, raising the ribs, your own body being thus thrown forward.

This enlarges the cavity of the chest and causes air to enter. When the ribs have been raised to the utmost extent, push yourself back, with a slight effort, to a more erect position, allowing the ribs to return to their natural position. This expels the air. Repeat the process fifteen times a minute. Be careful that the tongue does not fall backward and close the wind-pipe; if necessary, fasten it forward with a band around the jaw. It is never necessary to be rough with the patient. Gentle, firm and regular movements

are the best. As soon as the person is sufficiently restored to be able to swallow, give small quantities of hot brandy and water, hot wine and water or hot coffee, and use every effort to restore and maintain warmth.

Drug'gist. See APOTHECARY.

Dru'ids, the priests of the Celts of Gaul and Britain, who, according to Julius Caesar, possessed the greatest authority among the Celtic nations. They had some knowledge of geometry and natural philosophy, superintended the affairs of religion and morality and performed

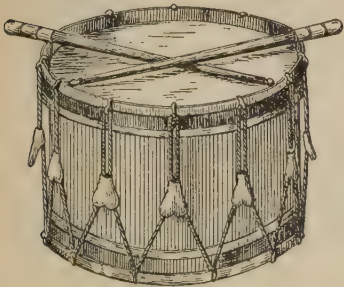
Drum

the office of judges. They venerated the mistletoe when growing on the oak, a tree which they likewise esteemed sacred. They had a common superior, who was elected by a majority of votes from their own number, and who enjoyed his dignity for life. They took unusual care to fence themselves round with mysteries, and it is probable that they cherished doctrines which were unknown to the common people; but that they had a great secret philosophy which was handed down by oral tradition is very unlikely. The public ceremonies were held round rude stone altars and in circles of stones set on end. Such circles may be seen at Stonehenge in England, but it is thought by scientists that the Druids merely made use of the work of people who lived long before their time. The Druids were nearly exterminated by the Romans in their occupancy of England.

Drum, a musical instrument played by being beaten with sticks. It is either cylindrical or hemispherical in shape, with the end or ends covered with tightened parchment, which is stretched or slackened at pleasure by means of cords with sliding knots or screws. Drums are of three kinds: 1, the *long*, or *bass*, *drum*, played with drumsticks having stuffed knobs on the end, and used only in large orchestras or military bands; 2, the *snare drum*, having two heads, the upper one only being played upon



KETTLEDRUM



SNARE DRUM

by two sticks of wood; strings, or snares, are stretched across the lower one, giving a peculiar resonant tone; 3, the *kettledrum*, a hemisphere of brass or cop-

per, the end of which is covered with parchment. Kettledrums are always used in pairs, one being tuned to the keynote, and the other to a higher key, the compass of the two together being an octave. The drum is of Eastern origin and is the oldest of existing instruments. See TOM-TOM.

Drum'mond, HENRY (1851-1897), a renowned preacher, professor and author, born at Stirling,

Drummond

Scotland, educated at Edinburgh University and the University of Tübingen, Germany. In 1877 he became professor of natural science in the Free Church College of Glasgow. During one of his vacations he visited America on a geological expedition to the Rocky Mountains. The lectures given during this tour furnished the foundation for his *Natural Law in the Spiritual World*. He also explored Australia and Africa in search of certain rare species of animal life. In 1893 he traveled through the United States, lecturing before college students and in the larger cities. Up to the time of his death he was engaged in religious work in the colleges of England and Scotland and with Dwight L. Moody in the United States. He was a magnetic preacher and a vigorous, stimulating writer. The works upon which his fame rests are *Natural Law in the Spiritual World*, *The Greatest Thing in the World*, *Pax Vobiscum*, *Tropical Africa* and *The Ascent of Man*, a reply to extreme Darwinian views.

Drummond, THOMAS (1797-1840), a Scotch inventor, born at Edinburgh. He was educated



HENRY DRUMMOND

at Edinburgh and at Woolwich, entered the army as an engineer and became assistant to Colonel Colby in the trigonometrical survey of Great Britain and Ireland. He invented a heliostat and first used the lime-ball light, which bears his name, about 1825, during the survey of Ireland. He subsequently entered political life and became undersecretary for Ireland, a coun-

Drummond

try which he practically ruled with great success for five years.

Drummond, WILLIAM (1585-1649), of Hawthornden, a Scottish poet. He was educated at the University of Edinburgh and was the first Scottish writer to abandon the native dialect for the language raised to supremacy by the Elizabethan writers. As a historian he is chiefly remarkable for an ornate style and a strong attachment to the High Church principles of the Jacobites.

Drummond Island, an island in Lake Huron, the only one of the Manitoulin Islands which belongs to the United States. It is a part of Chippewa County, Mich. See MANITOULIN ISLANDS.

Drummond Light or **Lime Light**, a very intense light produced by turning two streams of gas, one of oxygen and the other of hydrogen, in a state of ignition, upon a ball of lime. This light was proposed by Captain Drummond to be employed in lighthouses. It is now used in stereopticons and in theaters for producing stage effects. The gases are stored in copper cylinders under pressure, and illuminating gas is used in place of hydrogen.

Drum'mossie Moor. See CULLODEN MOOR.

Druses, *drooz'es*, a curious people, of mixed Syrian and Arabian origin, inhabiting the mountains of Lebanon and Anti-Lebanon. Their faith is a strange mixture of Mohammedanism and superstitions of various kinds. They are a self-contained people, and the secrets of their religion are not well understood. There are about 90,000 in all.

Dry'ads, in classical mythology, the nymphs who had special care of vegetation.

Dry'den, JOHN (1631-1700), an English poet, dramatist and satirist, the greatest writer of the Restoration period in England. He was descended from an ancient family, his grandfather being Sir Erasmus Dryden of Canons Ashby, Northamptonshire. He was born near Aldwinkle, Northamptonshire, and was admitted as a king's scholar at Westminster, whence he went to Trinity College, Cambridge, where he had been elected to a scholarship. After leaving the university he went to London as secretary to his cousin, Sir Gilbert Pickering, a favorite of Cromwell; and on the death of the Protector he wrote his *Heroic Stanzas* on that event, his first poem of importance. Although this showed a true appreciation of Cromwell's greatness, Dryden published two years later a poem in

Dryden

celebration of the restoration of Charles II. His first drama, *The Wild Gallant*, was produced in 1663 and it was not successful. From this time on, in rapid succession, he wrote almost thirty dramas and proved himself the greatest dramatist of his time. With all his great powers, however, he made no attempt to elevate the stage, but pandered to the corrupt tastes of the



JOHN DRYDEN

time, so that many of his dramas are disgustingly immoral. In 1670 Dryden was appointed to the offices of royal historiographer and poet laureate. The first of his political satires, *Absalom and Achitophel*, was produced in 1681, its aim being to censure the earl of Shaftesbury and his followers, who were trying to secure the succession to the throne for the duke of Monmouth. This was followed by *The Medal*, a satire against sedition, and *Mac Flecknoe*, a satire on the poet Shadwell. As a member of the Church of England, Dryden wrote, in defense of that church, his *Religio Laici*; but when, after the succession to the throne of the Catholic James, Dryden became a Catholic, he declared his new beliefs in the *Hind and Panther*. When William and Mary came to the English throne, Dryden was deprived of the offices of poet laureate and historiographer. During the remaining ten years of his life he produced some of his best work, including his admirable translations from the

classics and his *Ode in Honor of Saint Cecilia's Day*, better known as *Alexander's Feast*, one of the finest odes in the English language.

Dry Farming, a system of tillage adapted for semi-arid regions. In semi-arid regions rainfall during the growing season, when it is most needed, is practically unknown. The problem presented to the farmer, therefore, is how to store the small amount of water from the spring or fall rains until the plants need it, and then to prevent its evaporation during the growing season. The purpose of dry farming is to reclaim for agricultural purposes land areas which cannot be irrigated and have insufficient rainfall to produce profitable crops under ordinary methods of cultivation. Where the annual rainfall is less than 20 inches, ordinary methods of farming are not productive.

Dry farming is essentially a method of preparing the soil so that it will hold moisture as long as possible. The process of cultivation consists chiefly in deep, fall plowing, followed by harrowing. The disk harrow should be used before sowing and later as long as the growing crops permit. The deep plowing and frequent harrowing form a mulch of fine soil upon the surface which prevents evaporation. An important feature of the preparation of the soil is the use of the roller or sub-surface packer. Campbell, in his *Soil Culture Manual*, says that the "packer must follow close to the plow. The plowing done before noon should be packed before going to dinner, and that done in the afternoon packed before leaving the field at night."

The best crop for dry farming seems to be wheat. Corn is also profitable, and potatoes, sugar beets, alfalfa, and even peaches and other fruits have been successfully cultivated. There are, at the present time, about 800,000 acres in the United States and Canada available for dry farming. Nearly all of this area is in the western states, from Arizona north to Montana, and in southern Alberta and Saskatchewan. Consult Campbell's *Soil Culture Manual* and Widtsoe's *Dry Farming*.

Dry Tortugas, *tor too' gaz*, a group of ten small islands belonging to Monroe co., Florida, situated in the Gulf of Mexico, about 120 mi. w. by s. w. of the southern extremity of Florida Peninsula. The islands are low and partially covered with mangrove bushes. One contains a lighthouse, another, an old fort, which during the Civil War was used as a penal station.

Du Barry, *du ba re'*, MARIE JEANNE BECU. Countess (1743-1793), a mistress of Louis XV,

He became infatuated with her about 1769 and married her to the Comte Du Barry so that she might be brought to court. Until the death of Louis she was the real ruler of the country, and the most vital points in the policy of the government were decided by her. She was banished from the court after the death of Louis XV, and during the Revolution she was tried for having dissipated the public wealth and was executed.

Dub'lin, the capital of Ireland, is situated in Dublin co., 135 mi. w. of Liverpool, on the east coast of the island, at the mouth of the Liffey, the banks of which for more than two miles from the sea are lined with docks. At right angles to the river is Sackville street, a splendid street 700 yards long and 40 yards wide, forming a thoroughfare which is continued across the river by O'Connell Bridge, a magnificent structure the same width as the street. The principal public secular buildings are the Castle, the official residence of the viceroy; the Bank of Ireland, formerly the Irish Parliament house; Trinity College; the courts of justice; the customhouse; the King's Inns; the postoffice; the rotunda; the corn exchange; commercial buildings; the mansion house, and the city hall, or corporation buildings. The most important educational institutions are Trinity College (Dublin University), the Royal University, the Royal College of Science, the Roman Catholic University and the Royal Dublin Society. The environs of Dublin are remarkably beautiful. A little north-west of the city, up the Liffey, is Phoenix Park, with an area of 1759 acres, and Glasnevin, once the favorite residence of Swift, Steele and Sheridan, all of whom were born in Dublin. Dublin was taken by the Danes in the ninth century and was in their possession until the English conquest. Population in 1911, 309,272.

Dublin, UNIVERSITY OF, an institution founded in 1591 by Queen Elizabeth, as the College of the Holy and Undivided Trinity, the University and Trinity College being practically the same. The corporation now consists of a provost, seven senior fellows, twenty-six junior fellows and seventy foundation scholars. The senate of the university consists of "the chancellor of the university, or, in his absence, of the vice-chancellor, and such doctors or masters of the university as shall have and keep their names on the books of Trinity College." The senate possesses the right of electing the chancellor of the university; it is also the body which grants degrees. The scholarships are tenable for five years, or till the degree of M. A. is attained.

Dubois

Admission is by examination, and the course of general instruction extends over four years. The number of students is usually about 1300.

Dubois', PA., a borough in Clearfield co., 80 mi. n. e. of Pittsburg, on the Pennsylvania and the Buffalo, Rochester & Pittsburg railroads. Coal mining and lumbering are the principal occupations, but there are also iron works, tanneries and lumber mills, besides manufactures of mining and agricultural implements. Dubois was settled in 1873 and was made a borough in 1881. Population in 1910, 12,623.

Dubois, FRED T. (1851-), an American politician, born in Crawford County, Ill. He graduated at Yale in 1872 and in 1880 went to Idaho, where he engaged in business. He became United States marshal in 1882, was conspicuous in the anti-Mormon agitation in the following years and was delegate of the territory in Congress from 1887 to 1891. He was influential in securing the admission of Idaho as a state and was its first United States senator (1891-1897). He withdrew from the Republican national convention in 1896 and supported Bryan, but was defeated for the Senate in the following year. He was elected as a Democrat in 1901, and served until 1907.

Dubuque, doo buke', IOWA, the county-seat of Dubuque co., about 167 mi. n. w. of Chicago on the Mississippi River and on the Chicago Great Western, the Chicago, Burlington & Quincy, the Illinois Central and the Chicago, Milwaukee & Saint Paul railroads. The city is an important agricultural market and has lead and zinc mining interests. There are also railroad repair shops, flour and lumber mills, breweries, manufactories of boots and shoes, wagons, hardware and furniture. The two sash and door factories and the pump factories are said to be the largest of their kind in the world. The sheet metal works rank third largest in the world. The city has a public library and a United States government building and is the seat of Saint Joseph's College, Mount Saint Joseph's Academy, the German Presbyterian School of the Northwest, the Iowa Institute of Science and Arts and Woodbury Seminary. It is the oldest city in the state and was named in honor of Julian Dubuque, a French Canadian, who located here in 1778. The first permanent settlement was made in 1833. Population in 1910, 38,494.

Duc'at, a coin formerly common in several European states, especially in Italy, Austria and Russia. It was of either silver or gold, the average value of the former being 75 cents to

Duck

\$1.10. and of the latter, about \$2.32. The most famous of the ducats are those of ancient Venice, whose value was about \$1.46. Austria-Hungary still issues coins of this name.

Du Chaillu, du sha yu', PAUL BELLONI (1838-1903), a famous African explorer, born in New Orleans, of French parents. His father was a trader in Africa, and while he was young he spent much time in Africa making the acquaintance of different tribes and their languages. When he was eighteen, he set out on a regular exploring expedition. During the four years in which he was engaged in this he discovered many plants and animals which had never been known of before, and his reports were for some time scoffed at by scientists, who felt that they were incredible. He brought back with him several gorillas, which had never been hunted and which had rarely been seen by any European. The result of his journey was published in 1861, and two years later he set out on a second exploring expedition, an account of which, under the title, *A Journey to Ashango Land*, appeared in 1867. *The Land of the Midnight Sun*, an account of a tour in northern Europe, had great popular success.

Duck, a web-footed bird, related to the swan and goose. The ducks are very numerous and are met with all over the world. The species can be classed as *deep sea ducks*, which often obtain their food by diving to a great depth, and *river ducks*, which remain in shallow water. Some species are migratory, going northward in summer to their breeding places. The duck's food is partly vegetable, partly animal.

The common *mallard*, or wild duck, is the original of the domestic duck. In its wild state the male is characterized by the deep green plumage of the head and neck, by a white collar separating the green from the dark chestnut of the lower part of the neck and by having the four middle feathers of the tail recurved. Some tame ducks have nearly the same plumage as the wild ones; others vary greatly, being generally duller or pure white, but all the males have the four recurved tail feathers. There are several favorite varieties of the domestic duck, those of Normandy and Picardy in France and the Aylesbury ducks in England, being remarkable for their great size and delicacy of flesh. The *musk duck*, erroneously called the *Muscovy duck*, a native of South America, is the largest of the duck kind and approaches nearly the size of a goose. The *canvasback duck* is peculiar to America and is celebrated for the excellence of

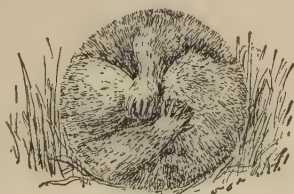
its flesh. Other species of ducks are the *shoveler*, remarkable for the strange form of its bill; the *gadwall*, which is more rare in America than in Europe; the *pintail*, remarkable for its long tail; the *black*, or *dusky*, *duck*, peculiar to America, and very abundant; the *summer*, or *wood*, *duck*, remarkable for its great beauty and for its migrations, which are directly opposed to those of other species; the *teal*, prized for its flesh, and the *eider duck*, so well known for its down. See EIDER DUCK; GADWALL; SHOVELER.

Duck-billed Platypus or **Duck-bill**, also called *ornithorhynchus*, the lowest of the mammals, a peculiar creature, living in the quiet streams of Australia, Tasmania and New Guinea. It is



DUCK-BILLED PLATYPUS

about twenty inches long, rather slender and covered with brown hair. Its head is small, and instead of a nose it has a horny bill, resembling that of a duck, except that the nostrils are at the extreme end, so that the animal can breathe with only the tip of his bill out of water. The male has on the heel a sharp horny spur, which he uses as a means of defense. Duckbills usually live in large colonies, each pair in a burrow made in the bank of a stream. The burrows are furnished with two openings, one above the water and one below, and sometimes they are extended a long distance into the bank. The food consists chiefly of insects and worms, which the animal comes out to get at night. On land duckbills walk about very clumsily on their short legs and webbed feet, but in water they are able to move very rapidly.



DUCKBILL ASLEEP

Ducking Stool, a device which was used in Great Britain and in the American colonies to punish a scold. It was composed of a chair fastened at the end of a strong beam, which, by means of a pivot, could be dipped into a pool or river. The scold was placed in this chair,

fastened securely and then dipped into the water. In some parts of England the ducking stool was in use up to the early years of the nineteenth century.

Duckweed, a little plant consisting of a flat cluster of very small leaves, minute flowers and little white rootlets. Duckweed is found floating in great quantities on the surface of shallow ditches and pools, which sometimes it covers with a broad green mat. It is eaten by ducks and other water fowl.

Ductility, the property of solid bodies, particularly metals, which renders them capable of being drawn into wire. The following is nearly the order of ductility of the metals which possess the property in the highest degree, that of the first mentioned being the greatest: gold, silver, platinum, iron, copper, zinc, tin, lead, nickel. Gold can be drawn into wire so fine that 500 feet of it will weigh less than a grain, and platinum, when combined with silver, can be drawn into wire 1-30,000 of an inch in diameter. Glass can be drawn into a thread so fine that a mile of it will weigh only one-third of a grain.

Dudevant, *du d'vahN'*, MADAME. See SAND, GEORGE.

Dudley, JOSEPH (1647-1720), a colonial governor of Massachusetts, born in Roxbury, Mass. He was the son of Thomas Dudley, a former colonial governor. He graduated at Harvard in 1665 and studied theology, but in 1673 he became a magistrate in Roxbury. In 1682 he visited England on behalf of the colonists, but became an ardent loyalist and was appointed to several high offices in New England and New York, in all of which he was arbitrary and tactless. In 1693 he again went to England, to become lieutenant governor of the Isle of Wight. In 1702 he returned to the United States and became governor of Massachusetts. This office he occupied until 1715.

Dudley, THOMAS (1576-1653), second colonial governor of Massachusetts Bay Colony. He was born in Northampton, England, and accompanied Winthrop to America in 1630, being appointed deputy governor. He was four times chosen governor of the colony, was a leading spirit in the establishment of Harvard College, founded Cambridge, Mass., and was twice president of the New England Confederation. He led the party of radical resistance to England.

Duel, (from Latin *duellum*, from *duo*, two), a prearranged combat between two persons,

with deadly weapons, for the purpose of deciding some private difference or quarrel. The combat generally takes place in the presence of witnesses, called *seconds*, who make arrangements as to the mode of fighting, place the weapons in the hands of the combatants and see that the laws they have laid down are carried out. The origin of the practice of dueling is referred to the trial by wager of battle, which obtained in early ages, although it was to some extent the outcome of the spirit and institutions of chivalry. In France, especially, dueling became common, and it is calculated that during eighteen years, in the reign of Henry IV, four thousand persons were killed in duels. Some French kings opposed the practice, while others promoted it, supposing that it tended to maintain a military spirit among the people. Dueling still prevails in France to a certain extent; but the combats are usually bloodless and ridiculous affairs. In the German army and the German universities the practice is common, though generally prohibited by law. The duels of German students, so often spoken of, seldom have serious consequences. While dueling was never as widespread in England as in France, it was common enough to call for constant attempts on the part of the government to suppress it. Only within the last half century, however, has the custom practically died out. In the United States duels are now very rare. In some of the states the killing of a man in a duel is punishable by death or by forfeiture of political rights, and in a large number the sending of a challenge is a felony.

Duero, *dwa'ro*, or **Douro**, one of the largest rivers of the Spanish peninsula, which, flowing west, traverses about one-half of Spain and the whole of Portugal, and after a course of 500 miles falls into the Atlantic 3 miles below Oporto. It is navigable for small vessels for about 70 miles.

Duff, ALEXANDER (1806-1878), a Scotch missionary to India. In 1829 he went to Calcutta as the first missionary of the Scottish Church of England, and he founded at Calcutta a school, which he intended to expand later into a college. In 1843, when the Church of Scotland was divided, he was obliged to give up his school and mission to the Established Church, as he adhered to the Free Church, but he soon established a new institution. The University of Calcutta was founded partly through his agency.

Dufferin and Ava, *ah'vah*, FREDERICK TEMPLE HAMILTON BLACKWOOD, Marquis of

(1826-1902), a British statesman, educated at Eton and Oxford. He served on various important missions and in various government offices before his appointment, in 1872, to the position of governor general of Canada. This office he held for six years, and he made himself very popular. After serving as ambassador to several European countries, he was sent in 1884 to India as viceroy, and he accomplished among other things the annexation of Burma and the establishment of the boundary line of Afghanistan.

Duffy, CHARLES GAVAN, Sir (1816-1903), an Irish patriot. He was prominently identified with the Irish National movement and was several times tried for sedition. In 1852 he was elected to Parliament, but he resigned in 1856 and went to Australia. Here he held important offices, including that of premier of Victoria. From 1880 until his death he lived at Nice.

Dugong', a native mammal of the Indian seas, resembling the whale in some respects. It has a tapering body, ending in a crescent-shaped, fin-like tail, and is said sometimes to attain a length of twenty feet, though generally it is about seven or eight feet long. The thick and smooth skin is bluish above and white on the lower parts and bears a few scattered bristles. The dugong's food consists of marine plants, which it finds in the mouths of large rivers. It yields little or no oil, but it is hunted by the Malays for its flesh, which resembles young beef and is tender and palatable. (See illustration on next page.)

Du Guesclin, *du ga klaN'*, BERTRAND (about 1320-1380), constable of France. To him is due much of the credit for the expulsion of the English from Normandy, Guienne and Poitou.

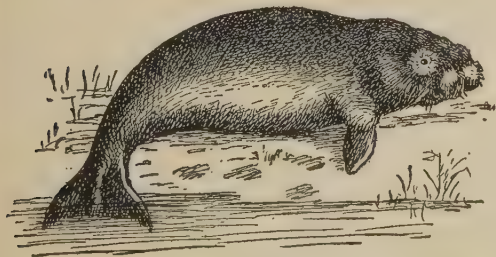
Duisburg, *doo'is burg*, a flourishing town in Rhenish Prussia, 13 mi. n. of Düsseldorf. It is an ancient place, believed to be of Roman origin. It early rose to be a free town and became a member of the Hanseatic League. It possesses a beautiful church of the fifteenth century, and has iron manufactories, engineering works, chemical works and cotton and woolen mills. It also is the seat of a large trade. Population in 1910, 229,478.

Dulcimer, *dul'sim mur*, one of the most ancient musical instruments, used in almost all parts of the world. The modern instrument consists of a shallow trapezium-shaped box without a top, across which runs a series of

wires, tuned by pegs at the sides and played on by being struck by two cork-headed hammers. It is interesting chiefly as being the prototype of the piano. The Hebrew psalter is supposed to have been a variety of the dulcimer.

Duluth, *du looth'*, MINN., the county-seat of Saint Louis co., about 155 mi. n. w. of Saint Paul and Minneapolis, at the west end of Lake Superior, on the Chicago & Northwestern, the Northern Pacific, the Great Northern and several other railroads. The city is beautified by about 400 acres of parks, including Central, Chester, Lincoln, Fairmount, Lester and several smaller parks, and 20 miles of boulevards. Lake View Terrace, running 7 miles along the bluff, some 500 feet above the lake, is an especially fine drive and commands one of the most beautiful of views. The Central High School is one of the finest public school buildings in the country, and the Duluth State Normal School also has good quarters. Other important structures are a Carnegie Library, the Federal buildings, the board of trade, the Spalding and Saint Louis hotels, the Wolvin building, the Masonic Temple, the Y. M. C. A and the Y. W. C. A. buildings and the Lyceum theater.

Duluth is situated on one of the finest natural harbors in the world. This bay is 9 miles long and 2 miles wide, and is separated from the main body of the lake by a narrow strip of land 7 miles in length, known as Minnesota Point. A ship canal which crosses the Point is spanned by an aerial bridge, the only one of its kind in the United States. (See illustration under BRIDGE.) The location at the western end of the Great Lakes makes Duluth the natural out-



DUGONG

let to the northwest, and it ranks as one of the chief commercial ports of the country. It is the terminus for about a dozen steamship lines, has docks which are among the largest in the world, and enormous grain elevators. Millions of tons of ore are shipped from the city each year. There are quarries of sandstone, granite and

slate in the neighborhood, and the fisheries are also important. The principal industrial establishments include blast furnaces, iron and steel plants, foundries, machine shops and flour and lumber mills.

The first European known to have visited the site where Duluth now stands was a French trader, Daniel Greysolon, Sieur Du Lhut, who in 1678 built a trading post on the north shore of Superior Bay. The first permanent settlement was made in 1853, and was named for the early explorer. Until 1880, growth was very slow, but in the ten years succeeding that date it was phenomenal. Duluth was incorporated as a town in 1867 and as a city three years later. Population in 1910, 78,466.

Duma or **Douma**, the name given to the lower branch of the Russian parliament, ordained by a manifesto of August 19, 1905. It is also called the National Assembly. The members of the Duma are elected by the Zemstvos, are about 500 in number and are entrusted, together with the Council of the Empire, with the legislative power in Russia. Bills passed by both the Council and the Assembly become laws when approved by the emperor. A bill vetoed by the emperor cannot be reintroduced at the same session. A bill defeated by one of the legislative bodies requires the consent of the emperor to be reintroduced. There are important restrictions upon the power of the Duma. It cannot discuss the reports of the minister of finance; it cannot discuss charges of malfeasance against officers of the government or members of the Council; it cannot consider questions relating to titles of nobility or entailed estates. All of these questions are to be determined by the Council of the Empire (see RUSSIA, subheads *History* and *Government*). The ministers have more legislative power than does the regular legislative body, for while any member of the Duma may propose a law, this cannot be presented to the house until it has received the approval of the minister of the department concerned. When the Duma is not in session the emperor may issue edicts which have the force of laws, but which may be set aside by the legislature at its next session.

Dumas, *du mah'*, ALEXANDER (1802-1870), a French novelist and dramatist. He was the grandson of the Marquis de la Pailleterie and a negress, from whom was taken the name Dumas, and from whom he inherited many characteristics, both physical and mental. In 1823 he took up his residence in Paris and

obtained an assistant secretaryship from the duke of Orleans, afterward Louis Philippe. He soon began to write for the stage and in 1829 scored his first success with the drama *Henry III*. The same year appeared his *Christine*, and other dramas followed in rapid succession. He then turned his attention to romance, with the definite purpose of writing a series of novels which should deal with the whole course of French history, and the result was his remarkable list of historical romances, of which the best-known are *Three Musketeers* and its con-



ALEXANDER DUMAS

tinuations, *Twenty Years After* and the *Vicomte de Bragelonne*. The *Count of Monte Cristo*, *The Black Tulip* and several others are also well known to English readers, through translations.

The works which bear Dumas's name amount to almost three hundred volumes, but the only claim which he could lay to many of the productions issued under his name was that he had either sketched the plots or revised them before they went to press. He earned vast sums of money, but his recklessness and extravagance reduced him to a shifty, scheming mode of living. For many years he wandered about Europe, until at length he was taken to live with his son, whom he had neglected in his childhood and had led into much recklessness and dissipation in his young manhood. He died at the home of his son.

Dumas, ALEXANDER (1824-1895), a French dramatist, son of the novelist of the same name.

His literary career began with the publication, in 1848, of a novel, *La dame aux camelias* (*Camille*), which was presented four years later in the dramatized form in which it has been so popular. All of his dramas deal satirically with the follies and vices of French society and present forceful arguments for social purity.

Du Maurier, *du mo rya'*, GEORGE LOUIS PALMELLA BUSSON (1834-1896), a British artist, caricaturist and novelist, born in Paris. He was a naturalized British subject, having gone to England in 1851. At first he studied chemistry, but soon adopted art as a profession. After studying in Belgium and France he began to draw for *Once a Week*, *The Cornhill Magazine* and *Punch*. He contributed to Harper's Magazine many illustrations, besides three novels: *Tribby*, on which his fame chiefly rests, *Peter Ibbetson* and *Martian*.

Dumbarton, *dum bahr't'n*, a seaport in Scotland, capital of Dumbarton co., on the Leven, near its confluence with the Clyde, 13 mi. n. w. of Glasgow. Shipbuilding is carried on to a great extent and there are foundries and engine works. A little to the south is the famous rock and castle of Dumbarton, rising above the Clyde. The castle stands on a steep, rugged rock, rising to the height of 560 feet. It is one of the four Scotch castles which were stipulated to be kept in repair by the terms of the treaty of union between England and Scotland (See SCOTLAND, subhead *History*). There has been a stronghold here from the earliest times, and the fortress of Dumbarton occupied an important place in Scottish history. It was once the prison of the hero Sir William Wallace, and it was also the residence of Mary Queen of Scots before she went to France. Population of town in 1911, 22,000.

Dumb-bells, weights usually in the form of two iron balls connected by a straight piece or handle. They are used in gymnastic exercises for strengthening the muscles of the arms and chest. The dumb-bells in ordinary use weigh from one to five pounds each, though much heavier ones are used in trials of strength.

Dumfries, *dum'frees*, a town of Scotland, capital of the county of the same name, on the Nith, 9 mi. from its mouth in the Solway Firth and 73 mi. s. of Edinburgh. There are iron foundries, hosiery and tweed factories, tanneries and coach-building works. The Greyfriar's Monastery, which once stood here, was the scene of the murder of the Red Comyn by Bruce in 1306. Burns spent his closing years

Dumouriez

here. His remains rest under a handsome mausoleum, and a statue of him was erected in 1882. Dumfries became a royal burgh in the twelfth century, in the reign of William the Lion. Population in 1911, 16,100.

Dumouriez, *du moo're ay'*, CHARLES FRANCOIS (1739-1823), a French general and politician. He served as an officer in the Seven Years' War, and in 1768 he went to Corsica as quartermaster general of the small army which was sent for the conquest of that island. During the latter part of Louis XV's reign, Dumouriez fell into disgrace and was thrown into the Bastille, but with the accession of Louis XVI he was restored to favor and was appointed governor of Cherbourg. At the outbreak of the Revolution he joined the Jacobins, and subsequently the Girondists, and in 1792 he was minister of foreign affairs. War breaking out between France and Austria, he resigned in order to take command of the army; he invaded Flanders, defeated the Austrians at Jemappes and conquered Belgium. Instead of prosecuting the war vigorously he now entered upon measures for the overthrow of the revolutionary government and the restoration of the constitutional monarchy. Summoned to trial as a traitor, he deserted to the Austrians, and the convention set a price of 300,000 livres upon his head. After various wanderings he found a final refuge in England. He was the author of *Memoires* and of a large number of political pamphlets.

Du'na or **Southern Dvina**, a river of Russia, rising near the sources of the Volga. It is over 600 miles long and is navigable for nearly its whole course, but is frozen for about four months each year.

Dü'naburg, in Russian, Dvinsk, a fortified town of Russia, in the government of Vitebsk, on the right bank of the Düna, 112 mi. s. e. from Riga. It has various industries and a considerable commerce. It is a great depot for the Russian artillery. Population in 1910, 110,354.

Dun'bar, PAUL LAURENCE (1872-1906), a negro poet, born in Dayton, Ohio, where he graduated at the High School and for some time served as an elevator boy. He worked at journalism in New York, and after 1898, the year of his marriage, he was on the staff of the Congressional Library. He gave frequent readings from his own works, which include *Poems of Cabin and Field*; *The Fanatics*, a novel; *Candle-Lightin' Time*, poems, and *Lyrics of Love and Laughter*. Mr. Dunbar usually wrote in dialect and portrayed, with perhaps the first

Dune

high poetic genius shown by his race, the actual humor and pathos of Southern negro life.

Dunbar, WILLIAM (about 1465-about 1525), the most eminent of old Scottish poets. On the marriage of James IV to Margaret of England, Dunbar celebrated the event in a poem of great beauty, entitled *The Thistle and the Rose*. His works consist of elaborate allegories, satirical and grimly humorous pieces and poems full of brilliant description and coloring.

Dunciad, *dun'si ad*, THE, a celebrated satirical poem by Pope, in which he ridicules his critics and foes. The first three books were published in 1728; the fourth book, or *New Dunciad*, appeared in 1742. In this latter part Colley Cibber was substituted for Theobald as the hero.

Dundee', a city of Scotland, in the County of Forfar, on the north shore of the Firth of Tay, about 8 mi. from the open sea, 37 mi. n. n. e. of Edinburgh. The chief educational institution is the University College, which opened in 1883. Here is a remarkable tower 156 feet high, built in the twelfth century. The town has long been celebrated for its textile manufactures, particularly those of the coarse linens, and it is now the chief seat of the linen trade in Scotland and of the jute trade in Great Britain. Shipbuilding is extensively carried on, and there are large engineering establishments. Another branch of business is the northern seal and whale fishery. Dundee was made a royal burgh in the twelfth century by William the Lion. It held an important place in the medieval history of Scotland. Population in 1911, 165,006.

Dundon'ald, EARL. See COCHRANE, THOMAS.

Dune, a hill formed by drifting sand. Strong winds drive sand and soil through the air very much as they drive snow. When the sand meets an obstacle like a boulder or log, some of it is lodged. Thus a small mound is formed, which, as it grows, continues to stop more sand. In this way low hills are formed along the coasts in sandy regions, and sometimes on the plains, where the surface contains either loose sand or soil. The height of these dunes varies from 40 to 200 feet. They are quite common along the Atlantic coast, among the cliffs in England and around the southern end of Lake Michigan, a region which, on account of these peculiar formations, is of special interest to geographers. See GEOLOGY; WIND.

Dunedin

Dune'din, capital of the provincial district of Otago, New Zealand, at the head of Otago Harbor, the most important commercial town in the colony. Though founded in 1848, its more rapid progress dates only from 1861, when extensive gold fields were discovered in Otago. There are many handsome buildings, both public and private, among them being the municipal buildings, the postoffice, the government offices, the university, the new museum and the Athenaeum. Several woolen and other manufacturing factories are now in existence, and the chief articles of export are wool, grain and potatoes. There is a regular line of steamers between this port and Melbourne, and communication is frequent with all parts of New Zealand. Population in 1911, 41,529; with suburbs 64,237.

Dunfermline, *dun fur'lin*, a royal burgh and city of Scotland, in the County of Fife, 3 mi. n. of the Firth of Forth and 16 mi. n. w. of Edinburgh. Dunfermline was early a favorite residence of the kings of Scotland, and here were born David II, James I, Charles I and his sister Elizabeth. The Benedictine abbey, founded by Malcolm Canmore in 1070, is now represented chiefly by the Abbey Church, underneath the pulpit of which are the remains of King Robert Bruce (See BRUCE, ROBERT). Dunfermline early took the lead in the manufacture of table linen, and it is still unrivaled by any other town in the kingdom. There are large collieries in the neighborhood. Population in 1911, 28,100.

Dun'kers, Dun'kards or Tun'kers, a religious sect founded in Schwartzenau, Germany, in 1708. It takes its name from the German *tunken*, to dip, from the mode of baptizing converts. Between 1719 and 1729, because of persecution nearly all members of this sect came to the United States and settled in Pennsylvania. They are now found in Ohio, Indiana, Illinois, Iowa and some of the southwestern states. In 1905 the total number of members was 114,194, with 1125 churches. They wear a plain and uniform dress, take no part in politics, take no oaths, avoid law suits and war, denounce divorce, abstain from the use of alcoholic drinks and discourage the use of tobacco.

Dun'kirk, a seaport town of France, in the Department of Nord, at the entrance of the Strait of Dover. It is surrounded by walls and is defended by forts and outworks. It has several fine churches, a college, a public library and a gallery of paintings. The manufactures

Duns

consist of earthenware, leather, soap, starch and ropes, and there are sugar refineries, breweries and ship-building yards. Population in 1911, 38,891.

Dunkirk, N. Y., a city in Chautauqua co., 48 mi. s. w. of Buffalo, on Lake Erie and on the New York Central, the Erie, the Lake Shore & Michigan Southern and other railroads. There is a good harbor and a large lake trade, and the industries include locomotive works, foundries, planing mills and shirt factories. The city contains several parks and is a popular summer resort. Other features of interest are the Brooks Memorial Library and the Brooks Memorial Hospital. Population in 1910, 17,221.

Dun'more, PA., a borough in Lackawanna co., 2 mi. n. e. of Scranton, on the Erie and the Lackawanna railroads. It is the seat of several public institutions, of which the State Oral School for Deaf and Dumb is the most important. Dunmore is in the anthracite coal fields and also has manufactures of brass, iron and silk. It was settled in 1835 and was incorporated in 1862. Population in 1910, 17,615.

Dunmore, JOHN MURRAY, Earl (1732-1809), a colonial governor in America. He was made a peer in 1756, became governor of New York in 1770 and of Virginia in 1771. He resolutely opposed the tendencies of the colonists to resist the British government, dissolved their assembly several times and frequently came into armed collision with them. He returned to England in 1776, and in 1787 he was appointed governor of the Bahama Islands.

Dunne, FINLEY PETER (1867-), an American journalist and humorist, born in Chicago. After obtaining a common school education, he went into newspaper work. He has become famous through his creation of one *Mr. Dooley*, a publican of Archey Road, who converses on political and social topics with his friend *Mr. Hennessey*. *Mr. Dooley in Peace and War*, his first volume of selections, obtained a wide circulation both in America and England. Several succeeding volumes have also been justly popular.

Duns, JOHN (1265-1308), commonly called Duns Scotus, an eminent scholastic divine. Little is known of his history. He was the apostle of realism, which was opposed to nominalism. Duns claimed that theology rests on a practical faith, an act of the will, and that "will is the mover in the whole kingdom of mind, and all things are subject to it." He

defended the doctrine of the Immaculate Conception against the Dominicans, a doctrine which has since been declared (1854) a necessary part of Catholic faith. Duns's chief works consist of commentaries on Aristotle, on the Bible and on the *Sentences* of Peter Lombard.

Dun'stan, SAINT (925-988), an Anglo-Saxon divine and statesman. He entered the Benedictine order, became an anchorite at Glastonbury and in 945 was made abbot by King Edmund. After the death of Edmund, Edred, the next king, made him his prime minister and principal director in civil and ecclesiastical affairs. In the reign of Edwy he was banished, but was recalled by Edgar and was made archbishop of Canterbury. Dunstan's counsels helped to make Edgar's reign a peaceful one. He was again deprived of power on the accession of Ethelred in 978 and devoted the last years of his life to his diocese and to the literary and artistic pursuits of his earlier days.

Dupleix, *du pla'*, JOSEPH FRANCOIS, Marquis (1697-1764), the most famous of the French governor generals in India. He first went to India in 1720 as a member of the superior council, and within the next twenty years he had fully proved his ability to cope with the difficult problems in India. In 1843 he was made general commandant of the French possessions there, and had he been well supported by the French government or the French East India Company he might have been able to establish firmly French rule. During the War of the Austrian Succession, the French and English came into conflict in India, and although the French were at first successful, they were compelled by the Treaty of Aix-la-Chapelle to restore to England Madras, which they had captured early in the struggle. Dupleix continued his ambitious plans after peace was restored, but the inadequate support which was given him allowed Clive gradually to gain the upper hand in India. Dupleix was recalled to France in 1754.

Du Pont', SAMUEL FRANCIS (1803-1865), an American naval officer, born at Bergen Point, N. J. He was appointed a midshipman in the United States navy in 1815 and was promoted through various ranks, until he became commander in 1842. He served in the war with Mexico and was made captain in 1855. In 1861 he was in command of the navy yard in Philadelphia, and he equipped and organized the naval force for service in the Civil War. He himself was appointed flag officer and was given

the command of the South Atlantic squadron which captured Port Royal, S. C., Jacksonville, Fla., and a number of other places. In 1862 he was made a rear admiral, but in the following year, after his repulse at Charleston, he was relieved by Admiral Dahlgren and took no further part in the war. He was the author of a treatise on the use of floating batteries for coast defenses.

Dupp'el, a fortified village in the province of Schleswig-Holstein, Prussia, on the coast of the Little Belt. The place is of considerable strategical importance and has been the scene of some severe struggles between the Danes, to whom it formerly belonged, and the Germans. It was captured by the Prussians in 1864, after a siege and bombardment which lasted nearly two months.

Dupre, *du pra'*, JULES (1812-1889), a French landscape and marine painter, the son of a porcelain manufacturer. He studied designing in his father's establishment and then took up painting by himself. Among his first works were *Interior of a Forest*, *View of Isle Adam*, *Evening* and *Environs of Paris*. After these followed his famous *Farmyard*, and later, as a result of a trip to England, *Environs of Southampton*. His landscapes are bright with color, having glaring reds and brilliant effects of every variety, in striking contrast to those of Corot. Others of his works are *Moonlight*, *The Pasture* and *Mowing Clover*.

Duquesne, *doo kane'*, PA., a borough in Allegheny co., near McKeesport, on the Monongahela River and on the Pennsylvania railroad. It has a Carnegie library, an institute and extensive blast furnaces and steel works. The place was settled in 1885 and was made a borough in 1891. Population in 1910, 15,727.

Durand', ASHER BROWN (1796-1886), an American painter and engraver, born in South Orange, N. J. His first great work was to engrave Trumbull's *Declaration of Independence*. In 1825 he produced *Musidora*, and in 1828, *General Jackson*. He made many plates for the annuals and engraved some heads for the National Portrait Gallery. In 1836 portraiture and landscape painting became his chosen occupations. Of portraits, he completed those of *Jackson*, *John Quincy Adams*, *Bryant*, *Kent* and others; of figure paintings he executed *Harvey Birch* and *Washington*, *The Wrath of Peter Stuyvesant* and *The Capture of Andre*. His best known landscapes are *The Catskills from Hillsdale*, *The Franconia Mountains* and *Mountain*

Forest. He was one of the founders of the National Academy of Design, and from 1845 until 1861 he was its president.

Durango, *doo rah'n'go*, a town in Mexico, capital of the State of Durango, about 500 mi. n. w. of the city of Mexico, on an elevation 6845 feet above the sea. It is well built, has a cathedral, a mint and manufactures of cotton and woolen goods and leather. It is an important mining center and is in a rich agricultural region. Population in 1910, 34,085.

Durant, *'HENRY FOWLE* (1822-1881), an American lawyer and philanthropist, born in Hanover, N. H. He graduated at Harvard in 1841 and afterward read law. In 1846 he was admitted to the bar and began practice in Boston. He retired from the practice of law in 1863, abandoned his real name, Henry Welles Smith, and made New York City his residence. He then became impressed with the necessity of higher education for women and endowed and founded Wellesley College.

Durban, the only seaport of Natal, and one of the most important ports in British South Africa. Among the public buildings are the town hall, a library and a theater. The harbor is very well protected and affords excellent accommodation. The port is situated at the terminus of two railway lines leading into Orange River and Transvaal colonies. Durban was founded in 1823 by the Dutch. Population in 1911, 72,512.

Dürer, *ALBRECHT* (1471-1528), a German painter, designer, sculptor and engraver on wood and metal. Before his visit to Venice in 1505, Dürer's work was stiff and angular, resembling the German school, but after this his art showed the influence of the Venetian painters and became more refined in composition and color. While in Italy he painted a large altarpiece for the chapel in San Bartolomeo. Maximilian I appointed him his court painter, and Charles V confirmed him in this office. He was very popular at court and with the common people. Luther, Melancthon, Erasmus, Bellini and Raphael were among his friends. He invented the method of printing woodcuts with two colors. Among his masterpieces in painting are *Crucifixion*, *Adam and Eve*, an *Adoration of the Magi* and portraits of Raphael, Erasmus and Melancthon. Among his best engravings on copper are his *Fortune*, *Melancholy*, *Adam and Eve in Paradise*, *Saint Hubert*, *Saint Jerome* and the so-called *Smaller Passion*.

Duress, in law, restraint or compulsion. It is of two kinds, *duress of imprisonment*, which is

imprisonment or restraint of personal liberty; and *duress per minas*, when a person is threatened with loss of life or with some injury. An act done under duress is voidable or excusable.

Durham, *dur'am*, N. C., the county-seat of Durham co., 26 mi. n. w. of Raleigh, on the Norfolk & Western, the Southern and other railroads. The city has extensive manufactures of cigars and cigarettes and contains one of the largest smoking-tobacco factories in the world. There are also cotton mills, fertilizer factories, foundries and other industries. It is the seat of Trinity College and has a school of fine art, a conservatory of music, a public library and Watts Hospital. Durham was settled in 1855. A Confederate army under General Johnston surrendered to General Sherman near here April 26, 1865. Population in 1910, 18,241.

Duse, *doo'za*, *ELEONORA* (1859-), an Italian actress. Her first appearance, at thirteen years of age, made no distinct impression, and it was not until several years later that her remarkable talents were recognized. Gradually, however, she came to be acknowledged as one of the greatest actresses of her time. In her tours in Germany, America, England and France, she was received with the greatest enthusiasm, especially as Juliet, Marguerite and Francesca da Rimini. Several of D'Annunzio's plays have been written for her, and in these she has met with her greatest successes.

Düsseldorf, a town of Prussia in the Rhenish province, situated on the right bank of the Rhine, 22 mi. n. n. w. of Cologne, one of the handsomest towns in the valley of the Rhine. The city is divided into four sections. It is a great focus of railway and steamboat communication and has a number of handsome public buildings and several remarkable churches. Among the public institutions, particular notice is due to the Academy of Art. Düsseldorf has the honor of having founded a school of painting, which takes the name of *Düsseldorf* and has had a large number of distinguished pupils. The Hofgarten is one of the finest public gardens in Germany. The industries embrace the manufacture of iron goods, cotton, leather, tobacco, carpets and chemicals, and the trade is large. Population in 1910, 357,702.

Dutch East Indies, a name given to the Dutch possessions in the Malay Archipelago, comprising Sumatra, Java, Madura, Riau Lingga, Billiton, Celebes, Moluccas, Bali and many minor islands, with parts of Borneo, Papua and Timor. The capital is Batavia.

The total area is estimated at 750,000 square miles, and the population is about 36,000,000.

Dutch Guiana, *ge ah'nah*. See GUIANA.

Dutch Metal, an alloy containing $8\frac{1}{2}$ parts copper and $15\frac{1}{2}$ parts zinc. It has a fine golden-yellow color, is ductile, malleable and tenacious. When beaten out by a process analogous to that for gold leaf, until the sheets are less than 1-50,000th part of an inch thick, it constitutes Dutch leaf, or Dutch foil, and is used instead of gold leaf for ornamental purposes. See GOLD BEATING.

Duties. See TAX; CUSTOMS DUTIES; EXCISE TAX.

Duyckinck, *di'kink*, EVERT AUGUSTUS (1816-1878), an American editor, born in New York City. After graduation at Columbia, he studied law and was admitted to the bar in 1837. He traveled in Europe, and on his return he became joint editor of the magazine *Arcturus*. From 1847 to 1853 he managed with his brother the *Literary World*, and later he published the *Cyclopaedia of American Literature*.

Duyckinck, GEORGE LONG (1823-1863), an American biographer, brother of Evert A. Duyckinck. He graduated at the University of New York and studied law, but found that his tendencies were all toward literature. With his brother he published the *Cyclopaedia of American Literature*, for which he is best known.

Dvina, *dve nah'*, a river of northern Russia, formed by the union of two small streams in the Government of Vologda. It flows in a north-westerly direction and falls by four mouths into the White Sea. At Archangel, before it divides, it is 4 miles broad. It is navigable as far as Suchona and is connected with the Volga by canal. The length of the river is 760 miles.

Dvinsk. See DÜNABURG.

Dvorak, *dvor'zhakk*, ANTONIN (1841-1904), a Bohemian musical composer, born in Mülhausen. He studied at the Prague Conservatoire and at Vienna and early began to compose works of large proportions. His best works, excepting the *Stabat Mater* and *Requiem Mass*, are those which deal with national Bohemian themes. From 1892 to 1895 he was director of the National Conservatory in New York. While in America he became interested in negro and indian melodies, and the finest expressions of these are to be found in his works. With Smetana he leads the Bohemian school of musicians.

Dwarf, a term applied to any animal or plant greatly below the usual size of its kind, particularly to an unusually small human being. Ac-

counts of dwarf tribes in Africa have been common from early times, and it would appear from the accounts of Du Chaillu, Schweinfurth and other travelers that there are several dwarfish tribes throughout that continent. Chief among these are the Akka dwarfs of Central Africa; and a race is said to exist in the Kono State, not as a distinct community, but mixed with other tribes. Individual dwarfs occur in all races and were formerly a fashionable appendage to the courts of princes and the families of nobles. Jeffery Hudson, the favorite dwarf of Charles I, at the age of thirty is said to have been only eighteen inches high, though he afterward grew to three feet nine inches. Bébé, the celebrated dwarf of Stanislas of Poland, was thirty-three inches; Wybrand Lolkes, a Dutch dwarf, when sixty years of age was only twenty-seven inches; Francis Flynn—"General Mite"—was only twenty-one inches at sixteen. The best-known dwarf of modern times was Charles H. Stratton—"General Tom Thumb"—who at the age of twenty-five was thirty-one inches in height. Unlike giants, dwarfs usually show no signs of mental weakness and are often, on the contrary, exceptionally bright. They are in many cases, too, perfectly proportioned; but some physical abnormality usually accompanies dwarfism.

Dwarfing, the process of training up trees or shrubs for ornament in houses, so as to cause them never to reach more than a very small size, by keeping them in poor soil, giving them little water and pinching off strong shoots. Formerly dwarfing was practiced only by the Chinese and Japanese, for producing ornamental shrubs, but it is now common among fruit growers and on coffee plantations. Fruit trees are often dwarfed by grafting the cion upon a slow-growing trunk. Coffee trees are kept trimmed to increase the number of small branches upon which the fruit is borne. See GRAFTING.

Dwight, *dwite*, THEODORE (1764-1846), an American journalist, born at Northampton, Mass. He studied law, was admitted to the bar and became engaged in many political controversies as a pronounced Federalist. After serving in the state senate, he was elected to Congress in 1806. He edited various papers in Hartford, Albany and New York and published a *History of the Hartford Convention* and the *Character of Thomas Jefferson as Exhibited in his own Writings*.

Dwight, TIMOTHY (1752-1817), an American divine, born in Massachusetts. His father was

Col. Timothy Dwight, and his mother a daughter of Jonathan Edwards. He served as chaplain in the Revolutionary army and ultimately became president of Yale College. His *Theology* (1818) was for long a standard, both in Britain and in America. He was also the author of two poems the *Conquest of Canaan* and *Greenfield Hill*, besides numerous unimportant works, consisting of dissertations and occasional sermons. A grandson, Timothy Dwight, was elected president of Yale in 1886 and was a member of the American committee for the revision of the English version of the Bible.

Dyaks, the aborigines of Borneo, chiefly inhabiting the interior of the island. They are a finely formed race, of a yellow complexion, and are described as docile, industrious and superior to the Malays, exceeding them in stature and often in good looks. The more advanced of them practice agriculture and dwell in neatly constructed and tolerably comfortable houses. Hunting their enemies to make trophies of their heads is practiced among them, but it has been abolished where European influence prevails.

Dyeing, *di'ing*, the art of fixing a new and permanent color on textile fabrics, usually cotton, linen, silk and wool. All fabrics must be thoroughly cleaned before placing them in the dye. Cotton and linen fabrics go through a prolonged series of operations in bleaching (See BLEACHING). Silk is boiled in a solution of fine soap to remove the fatty matter, and wool is cleansed by scouring in weak soap or soda lye or weak ammonia.

The process of dyeing varies much according to the stuff and the coloring matters used. In general, animal fibers, like silk and wool, combine more easily with most colors than vegetable fibers, such as linen and cotton. In the case of the former, for example, a simple immersion in aniline dyes is sufficient to produce a fixed color. Some dyes will not unite directly with the fibers so as to produce a good and permanent color. These dyes require the intervention of another agent to fix them on the different stuffs, and the name *mordant* is applied to those substances which are employed to make the stuff to be dyed and the dyeing color combine. Alum, acetate of alumina, chloride of tin, salts of iron, albumen, gluten and tannin are common mordants. The mordant is generally dissolved in water, into which the stuffs to be dyed are plunged. In some cases it is mixed with the color, and both are applied to the stuff at the same time. An important

characteristic of mordants is their power of affecting the natural tint of the dye and thus enabling a variety of shades to be produced at small expense. Thus, nitrates tend to give a yellow tinge to the colors; alumina deepens and oxide of tin brightens the natural tints. See CALICO PRINTING.

Dyer's Weed, a plant of the same genus as mignonette, otherwise called yellow weed, weld or woad. This plant affords a beautiful yellow dye and is cultivated for that purpose. It grows in waste places and has become naturalized to some extent in the United States.

Dynam'ics, that branch of physics which deals with the laws of force. Dynamics is usually divided into *statics*, which treats of force when motion is not produced, and *kinetics*, which treats of forces that produce motion. All forces are so nearly alike in their effect as to be subject to the same laws and principles. They can also be estimated by common measure. Owing to the two systems of measure in general use, the English and the metric, there are two units by which force is measured. These are the *poundal*, used with the English system of weights and measures, and the *dyne*, used with the metric system (See DYNE; POUNDAL). Force is measured by its effect upon mass, the term which indicates the amount of matter per unit of space. The resistance which a body offers to force is directly proportional to its mass, and the relation of an impressed force and a body free to move with no other resistance than its inertia, is generally expressed in the following law, which is considered a maxim in physics:

"The velocity produced in a body free to move without resistance in a unit of time will be directly proportional to the intensity or amount of the impressed force and inversely proportional to the mass of the body."

The science of dynamics is founded almost entirely on three principles, known as Newton's Laws of Motion. These are:

(1) A body at rest remains at rest, and a body in motion moves with a uniform velocity in a straight line, unless acted upon by some external force.

(2) A given force will produce the same effect, whether acting upon a body in motion or at rest, whether the body is acted upon by that force alone or by others at the same time.

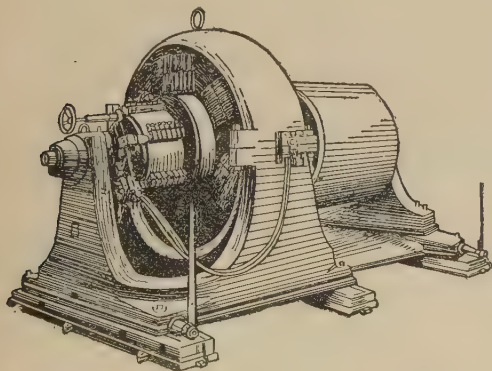
(3) The action of every force is accompanied by an equal reaction in the opposite direction.

Dy'namite, an explosive substance, made by soaking porous clay, wood fiber or rotten

Dynamo

stone in nitroglycerine. The most explosive variety is made by dissolving guncotton in nitroglycerine and saturating wood pulp with the mixture. This variety is put up in cartridges, in the form of sticks eight inches long and one and one-half inches in diameter. Dynamite is used under various names, such as giant powder, rend-rock and Hercules powder. It is employed in blasting. See **BLASTING**; **NITRO-GLYCERINE**.

Dy'namo or **Dynamo Electric Machine**, a machine for generating electricity by mechanical action. The necessary parts of a dynamo are the *field magnet*, the *armature* and the *commutator*. The principle upon which the dynamo works is that magnetism can be generated by electricity, and that electricity also induces magnetism (See **ELECTRO-MAGNETISM**). The field magnet is either a permanent steel magnet or an electro-magnet, but in most machines the electro-magnet is used. Either the magnet or the armature revolves, according



DYNAMO

to the pattern of the machine. The current is reversed by the rotation of the commutator. Since the revolution is very rapid, a large number of reversals occur in a minute, thus producing a very strong current. Metal brushes in the form of springs are connected with the machine, so that the current is conducted over wires to the point where it is desired for use. The commutator consists of a series of brass or copper segments, insulated from one another

Dysodile

at the axes and connected with the coils of the armature. This serves to reverse the current every time a segment of it comes in contact with the brush.

There are numerous patterns of dynamos, each of which is adapted to some special line of work. The simplest form has but two poles and is called *bi-polar*, but the larger dynamos have as many poles as they are able to contain magnets and are known as *multi-polar*. The large machines are used in generating currents for electric lights or electric railways and for furnishing power to electric motors in factories. The most acceptable pattern of dynamo is one in which the generating apparatus is attached directly to the shafting operated by the engine or water wheel, and this pattern is in general use in nearly all of the large electric plants. The largest dynamos in the world are found at Niagara Falls and are attached directly to the water wheels which furnish the motive power.

Dynamom'eter, any instrument for measuring the relative strength of men or animals or the force of machinery. Commonly it consists of a spiral spring, similar to that in the spring balance, with a scale and indicator attached. When the pull upon a draught implement, as a plow for instance, is the point to be determined, the dynamometer is made a link in the draught chain, and the amount of extension or collapse which it suffers indicates the intensity of the strain.

Dyne, a unit of force, used when the metric system is employed for measuring force. In physics it is generally known as the unit of the centimeter-gram-second system. It is a force which, acting upon one gram of matter for one second, will give it a velocity of one centimeter per second. This is such a small unit that in practice a larger unit, called a megadyne, is employed. This is equal to one million dynes. See **DYNAMICS**.

Dysodile, *dis'o dile*, a yellowish or greenish foliated mineral, found in limestone, with remains of fish and of plants, which, when ignited, burns and emits a bad smell. It is closely related to amber.



E, the second vowel and the fifth letter of the English alphabet. In form it is almost the same as in the earliest Greek. It occurs more frequently in English words than any other letter of the alphabet. In English its long or natural sound, as in *me*, coincides with the sound of *i* in the Italian and French languages. It has also another principal sound, a short one, heard in *met*, *men*. It has, besides, a sound like *a* in *bare*, as in *there*, and the obscure sound which is heard in *her*. As a final letter in English it is generally silent, but it serves to indicate that the preceding vowel is to have its long sound, as in *mane*, *cane*, *plume*. When two *e*'s come together the sound is generally the same as that of the single *e* long, as in *deem*, *esteem*, *need*.

In music, *E* is the third note in the diatonic scale of *C*.

Eads, eedz, JAMES BUCHANAN (1820-1887), an American engineer, born at Lawrenceburg, Ind. At an early age he went to Saint Louis and became a clerk on a steamboat. By the time of the Civil War he had become famous as an authority on all matters relating to the navigation of the Mississippi and was asked by President Lincoln for his advice in regard to the practicability of a fleet of gunboats on the Mississippi and other western rivers. The fleet was built and these boats rendered valuable service to the government, and it was with them that Fort Henry was captured in 1862. Eads's next work of importance was the designing and constructing of the famous Eads Bridge over the Mississippi River, connecting Saint Louis and East Saint Louis. It is considered one of the finest bridges in the world. Following this was his construction of the jetties at the mouth of the Mississippi, by which the channel of the river was kept clear to a depth sufficient to permit the navigation of the largest ocean-going vessels. This was a new departure in American engineering and met with disfavor at first, but Mr. Eads's faith in his plan was so

great that he offered to build the jetties at his own expense upon the condition that should they be satisfactory he should receive a large sum for the work. Eads was a promoter of many improvements along the Mississippi River. He engaged in extensive engineering operations at home and abroad. He was the first American to receive the Albert medal, conferred by the British Society for the Encouragement of Arts, Manufactures and Commerce. See JETTY.

Eagle, e'gl, the general name for a great group of birds related to the falcons and hawks.



GOLDEN EAGLE

The eagle is popularly regarded as the noblest and most courageous of birds. It flies to a greater height than any other bird, and from this circumstance the ancients considered it as a messenger of Jove. The eagle was on the standard of the old Romans, and now appears in the national ensigns of the United States, Germany, Russia and other nations. While

the birds really have wonderful power of vision and of flight and are noble in appearance, the habits of most are those of thieves, and none of them have any apparent objection to eating dead and decaying flesh. Birds of the typical genus have long and powerful bills, the upper mandible curved sharply over the lower, have wings reaching to the tip of the tail and legs feathered to the toes. The *golden eagle* is common through Europe, Asia and northern Africa. It measures over six feet from tip to tip of the



HEAD AND FOOT OF BALD EAGLE

expanded wings, and three feet from the beak to the end of the tail. The body is brownish, the feathers of the head and neck pointed and of a golden hue. The national emblem of the United States is the *bald eagle*, one of the fishing eagles, which takes its name from the fact that in mature birds the head and neck are white. It is a handsome animal which has an air of great nobility, especially upon the wing. If left undisturbed, bald eagles will return to the same nest year after year. The eagle seems particularly fond of the dead fish which it finds

along the shore, and is not averse to seizing the prey which smaller birds have captured. There are a number of other species of eagles, both large and small, found in different parts of the world, and some confusion exists in the use of the name. See **HARPY** and **LAMMERGEIER**.

Eagle, a gold coin of the United States, of the value of ten dollars. It was first coined in 1795. There are also half-eagles, quarter-eagles and double eagles, of proportionate values.

Eagle. The eagle first appears as a military standard among the Persians. It was one of the first military standards of the Romans, having been adopted in 104 B. C., as the chief emblem to be borne at the head of the legions. Eagles were sometimes of gold, but oftener of silver, and were carried on the top of a spear. The eagle of Russia to-day is double-headed, and is the national military symbol. The eagles of Prussia and of the United States are single-headed. That of the United States, the bald eagle with wings displayed, is the national emblem and was adopted in 1785.

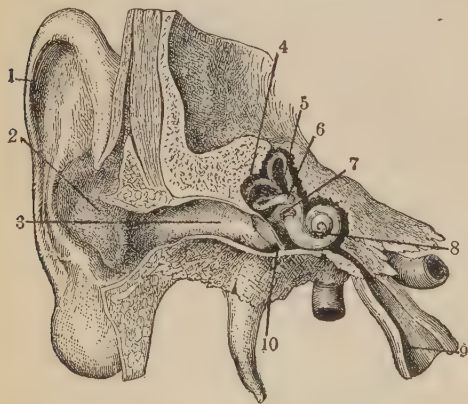
Eames, *eenz*, **EMMA** (Emma Hayden Story) (1867–), an American soprano singer, born in Shanghai, China. After her parents returned to America in 1872, her musical education was carefully guided. She studied in Boston and Paris and made her début in 1889 as Juliette at the Grand Opera, Paris, after which she gained remarkable success in all parts of the world. She married Julian Story in London in 1891.

Ear, *eer*, the organ of hearing. In the lower orders of animals the ear is quite small and capable of perceiving only a few sounds, but it may be more acute than the human ear in recognizing these sounds. In man and all higher orders of animals the ear consists of three divisions, the external ear, the middle ear and the internal ear.

THE EXTERNAL EAR, or **CONCHA**, consists of the auricle, which is the part usually called the ear, and the auditory canal. In many animals the external ear is movable, but in man it is not. The human external ear consists of cartilage, skin and a thin, muscular coat and has a peculiar form. The outer rim is known as the *helix*, and the structure is so shaped as to attract sound waves into the auditory canal, which is a passage leading to the membrane separating the external from the middle ear. This is known as the membrane of the *tympanum* or eardrum, and is a circular membrane stretched across the inner end of the auditory canal, its rim being attached to the bone forming the walls of the tympanum.

The membrane contains a number of muscles, some of which are joined to the bones of the middle ear, and its inner surface is lined with a mucous membrane.

THE MIDDLE EAR or TYMPANUM is a cavity filled with air, which enters it through the Eustachian tube. It contains three small bones known as *ossicles*. From their peculiar shape these bones are called the *hammer*, the *anvil* and the *stirrup*. The hammer consists of a head, neck and handle, the last being attached to the eardrum. The anvil has a concave surface into which the head of the hammer fits, and the stirrup at one end is joined to the anvil, and at



SECTION THROUGH RIGHT EAR

1, helix; 2, concha; 3, outer passage; 4, 5, 6, semicircular canals; 7, oval window; 8, cochlea; 9, Eustachian tube; 10, eardrum.

the other to the vestibule of the internal ear. These bones are so placed as to transfer the vibrations of the eardrum to the internal ear.

THE INTERNAL EAR, or LABYRINTH, is located in a small cavity in the temporal bone, and is divided into the vestibule, the semicircular canals and the cochlea. The vestibule is a small triangular cavity between the semicircular canals and the cochlea. The base fits into the opening which connects this with the middle ear. The *semicircular canals* are three in number and occupy vertical, oblique and horizontal positions, as shown in the diagram. Each connects with the vestibule by two openings. The *cochlea* or *snail shell* is a gradually tapering canal winding two and one-half times around a central bony axis. The cavity of the cochlea is divided into two passages by a stiff spiral plate and a membrane composed of a large number of strings extending from the outer edge of the bony plate to the walls of the cavity. The internal ear is filled with fluid, within which floats a membrane

in shape and outline corresponding exactly to those of the bony cavity. Within this membrane is still another fluid, in which are found the sensory fibers of the auditory nerve and the *organ of Corti*. This consists of two rows of pillars or rods and extends the entire length of the cochlea. The number of rods is estimated at anywhere from 10,500 to 24,000, while the number of strings is 3000. These rods and strings are connected with the filaments of the auditory nerve. They are of different lengths and sizes and it is through them that the sound vibrations which enter the ear are reproduced.

HEARING. Hearing involves both physiological and mental action. For the production and transmission of sound, see SOUND. The external ear collects the sound waves and reflects them to the auditory canal, where they strike against the eardrum, which they cause to vibrate. By means of the bones in the middle ear the vibrations of the eardrum are intensified and at the same time transmitted to the internal ear at the vestibule. Here they set up vibrations in the fluid. The strings and rods in the organ of Corti, which can vibrate in harmony with these vibrations, respond just as do the strings of a piano that produce a note sung near the instrument. The vibrations in the organ of Corti stimulate the sensitive fibers of the auditory nerve connected with the vibrating rods, and the nerve impulses thus created are carried to the auditory centers of the brain, by which they are translated into sound. Hence, the final act of hearing is a mental act.

The muscles of the middle ear regulate the tension of the eardrum so that it can respond equally well to vibrations that produce high or low tones, and the large number of rods and pillars of the organ of Corti enable us to recognize a multitude of sounds.

Early, *ur'ly*, JUBAL ANDERSON (1816-1894), an officer in the Confederate army. He was born in Franklin co., Va., and graduated at West Point in 1837. He served in the Florida and Mexican wars, and after his adoption of the law as a profession, was a member of the state legislature and state's attorney. Although firmly opposed to secession, he held to his state and entered the Confederate army as colonel. At the first battle of Bull Run he was instrumental in saving the day for the Confederates, and he fought in the battles of Fredericksburg, Chancellorsville and Gettysburg. He also commanded in the Shenandoah Valley, where he was defeated by Sheridan. His lack of success

Earring

compelled General Lee to remove him from command, but many military critics place him next to Lee and Jackson among the Confederate soldiers.

Earring, an ornament fastened to the ear, which is pierced for the purpose. Earrings are of very ancient origin, having been worn among the early Egyptians and Assyrians and also among the early Greeks and Romans. Among the earliest people they were regarded as a sign of rank, and were worn by kings, nobles, gods and geni. There was a great variety of design, the general form being a pendant in the shape of a cross, crescent or ring. The materials most used were gold and silver and pearls. Among the Greeks and Etruscans earrings were commonly worn by the women. The designs were very elaborate and beautiful, and the ornaments were prized for their workmanship. The Romans valued earrings according to the richness of the material, and cared less for artistic effect. The practice of wearing earrings is common to-day among peasant classes in Europe and among Oriental nations.

Ear Shell. See ABALONE.

Earth, *urth*, the planet which we inhabit, the third from the sun and the fifth in size. It is attended by one satellite. See MOON.

SHAPE. To an observer whose view is not obstructed, any part of the earth presents itself as a circular and horizontal expanse, on the circumference of which the heavens appear to rest. Accordingly, in remote antiquity the earth was regarded as a flat, circular body, floating on the water. But even in antiquity the spherical form of the earth began to be suspected. It is only on this supposition that we can explain why the horizon of vision grows wider and wider the higher the position we choose, why the tops of towers and mountains at a distance become visible before the bases, why the hull of a ship disappears first as she sails away, and why, as we go from the poles toward the equator, new stars become visible. Besides these proofs there are many others, such as the circular shadow of the earth seen on the moon during an eclipse, the gradual appearance and disappearance of the sun, and, lastly, the fact that since 1519 it has been regularly circumnavigated.

The earth is not, however, an exact sphere, but is very slightly flattened at the poles, so as to have the form known as an *oblate spheroid*. In this way the *polar diameter*, or diameter from pole to pole, is shorter than the diameter at right angles to this—the *equatorial diameter*.

Earth

The most accurate measurements make the polar diameter about 27 miles less than the equatorial, the equatorial diameter being found to be 7,925.6 miles, and the polar, 7,899.14.

SURFACE LINES. The earth is regarded as divided into halves—the northern and the southern hemisphere—by the *equator*, an imaginary line passing around it midway between the poles. In order to indicate with precision the position of places on the earth, additional lines are imagined to lie on the surface in such a manner that those of one set all pass through both poles, while those of the other are drawn parallel to the equator. The former are called *meridians*, the latter *parallels of latitude*, and by them we can tell the latitude and longitude, and thus the exact position of any place on the earth's surface.

DENSITY. Many experiments by various methods have been made in order to determine the average density of the earth, that is, the quantity of matter it contains, and from them it has been calculated that the density of the earth is about five and one-half times that of water.

MOTIONS. The earth, in common with the other planets, moves around the sun, completing its revolution in about $365\frac{1}{4}$ days, our *common year*; or exactly 365 days, 9 hours, 9 minutes and $9\frac{3}{10}$ seconds, making the *sidereal year*. The orbit of the earth is an ellipse, with the sun in one of its foci. Hence, the earth is not equally distant from the sun in all parts of the year, but is about 3,000,000 miles nearer at one time than at another, its least distance, according to recent calculations, being 89,897,000 miles, its greatest 92,963,000, and the mean distance, or half the length of the long axis of the orbit, 91,430,000 miles. From this it may be calculated that the velocity of the earth in its orbit is about 17 miles a second. In the winter of the northern hemisphere the earth is nearest the sun and in summer farthest from it; for the difference in the summer and winter temperature is not occasioned by the greater or less distance of the earth from the sun, but by the more or less oblique direction of the sun's rays. The passage of the earth around its orbit causes the sun to appear to describe a similar orbit in the heavens; and hence it is that at one time of the year one group of stars is seen in the neighborhood of the sun at sunrise and sunset and at another time another group. This apparent path of the sun is the *ecliptic*, and corresponds with what would be the path of the earth as seen from the sun; and the groups of stars through which the sun successively passed form the *zodiac*.

The earth's daily motion about its own axis takes place, according to mean time, in twenty-three hours, fifty-six minutes and four and one-tenth seconds. The axis on which the earth performs its rotation is inclined towards the plane of its path about the sun at an angle of $23\frac{1}{2}^{\circ}$ (which angle also represents that between the plane of the ecliptic and the plane of the earth's equator), the sun ascends in the heavens from March 21 to June 21 (the summer *solstice*), about $23\frac{1}{2}^{\circ}$ above the equator toward the north pole, and descends again toward the equator from June 21 to September 23; it then sinks till December 21 (the winter *solstice*), about $23\frac{1}{2}^{\circ}$ below the equator toward the south pole, and returns again to the equator by March 21. This arrangement is the cause of the seasons and of the inequality of day and night attending them. For all countries lying beyond the equator, day and night are equal only twice in the year (at the *equinoxes*). At the summer solstice the north pole of the earth is turned toward the sun, and the south pole away from it, and for $23\frac{1}{2}^{\circ}$ about the north pole there is a period of longer or shorter duration during which the sun is continually above the horizon for more than twenty-four hours, while round the latter is an equal extent of surface within which the sun for similar periods is below the horizon. The reverse condition holds at the winter solstice. The circles bounding these regions are called respectively the *arctic* and the *antarctic* circle, and the regions themselves the *polar* or *frigid zones*. Throughout a region extending to $23\frac{1}{2}^{\circ}$ on each side of the equator the sun is directly overhead at every point in succession twice in the year. The circles which bound this region are called the *tropics*, that in the northern hemisphere being the tropic of *Cancer*, that in the southern the tropic of *Capricorn*, while the region between is the *torrid zone*. The regions between the tropics and the polar circles are respectively the *north* and *south temperate zones*.

SURFACE. The surface of the earth contains over 196,000,000 square miles, of which scarcely a third part is dry land, the remaining two-thirds being water. The land is arranged into masses of irregular shape and size, the greatest connected mass being in the eastern hemisphere. The chief masses receive the name of continents, detached masses of smaller size forming islands. The surface of the land is variously diversified, exhibiting mountains, valleys, plains, plateaus and deserts. The water area of the earth is divided into oceans, seas, bays, gulfs and sounds,

while rivers and lakes may be regarded as features of the land surface. The great phenomena of the oceans are currents and tides.

INTERIOR. From the evidence furnished by volcanoes, hot springs and the sinking of mines, it is known that the earth has a high internal temperature of its own. Taking the average of the various observed rates of increase, this temperature seems to increase 1° F. for every sixty feet of descent. Assuming this to continue, the rocks at a depth of two miles would be as hot as boiling water, and at a depth of fifty miles the heat would be such as at the surface would melt every known solid. This being so, various theories as to the internal condition of the earth have been proposed: 1, That a thin envelope or crust surrounds a molten interior. It can be shown, however, that as tides must be produced in such a molten mass the cool outer crust would be unable to withstand the enormous force of these unless it were about 2,000 miles thick. 2, That the interior is solid, with spaces here and there filled with liquid or gaseous material. This theory assumes that there are within the earth enormous cavities filled with molten rock, which escapes, when local pressure is removed, in the form of volcanic outbursts. 3, That the earth consists of a thin crust, a large solid nucleus, and a liquid film between the nucleus and the crust; the temperature at the center being not much greater than comparatively near the surface. 4, That the earth is solid to the center, but any part may become liquid if local pressure is removed. We know that if the pressure on a solid be increased the melting point is correspondingly raised; now the pressure at the center of the earth, or even at the depth of fifty or one hundred miles, must be something enormous, and probably is so great as to keep the rocks there permanently in a solid condition, notwithstanding the heat. This last theory is considered the most probable. On the supposition of its correctness, volcanoes might be explained by supposing that at certain points here and there pressure is removed by the elevations of portions of the earth's surface which are constantly taking place, and that this allows the rocks to liquefy. Water may then soak down to these liquid rocks, and, being converted into steam, produce various volcanic phenomena.

The earth is believed to have condensed and solidified from a gaseous or nebular condition, and to have once had a far higher temperature than now. If such were the case the outer surface, losing heat by radiation, would be the first

Earth Currents

part to cool quickly; while the interior, losing its heat by conduction, would not cool so rapidly, and therefore would naturally have a higher temperature than the portion at the surface. This is what all observations indicate the condition of the earth to be, and the shape of the earth also indicates that it must once have been in a fluid state.

ATMOSPHERE. The earth is surrounded by an atmosphere which moves with it and is really a part of it. Upon the surface of the earth proper this atmosphere presses with a force of 15 pounds to the square inch. The atmosphere has a thickness of from 50 to 60 miles, but it is so much denser below that half of its bulk is within $2\frac{1}{2}$ miles of the surface.

MAGNETISM. Another feature that the earth as a whole presents is magnetism. When a magnetic needle is balanced on a point it remains at rest in one position only, pointing then nearly due north and south. This can be explained only on the supposition that the earth acts as a great magnet. It has, in fact, two poles—a north and a south magnetic pole—which are not very far from, but by no means coincident with, the geographical poles. The north magnetic pole was located exactly in 1905. There is also a neutral line or magnetic equator, which does not greatly diverge from the geographical equator. The earth acts upon all magnets as they act upon one another, and it is for this reason that they point north and south.

Earth Currents, violent electrical disturbances of the nature of transient currents, which rush in one direction or another, and by which telegraphic lines, and particularly long submarine lines, are constantly troubled. The origin and nature of earth currents are not thoroughly understood, but they are found to be very intimately connected with the disturbances of terrestrial magnetism, called magnetic storms, and these, it is well known, are closely connected with the appearance of the aurora borealis and with the occurrence of the sun's spots. See **AURORA BOREALIS**.

Earth'enware. See **POTTERY**.

Earth'nut, a name given to the tubers of several very different plants, but particularly to those of a plant belonging to the parsley family. These tubers or nuts are about four or six inches below the surface, at the termination of a long, slender root. They are brown, the size of chestnuts, of a sweetish taste, resembling the common chestnut. Swine are very fond of the nuts, and fatten rapidly where they are

Earthquake

abundant. In some localities peanuts are called earthnuts.

Earth'quake, a movement of the earth's crust, caused by some internal convulsion. Three kinds of earthquake movements are generally recognized. These are the wave movement, the vertical movement and the circular, or twisting, movement. The first is the most common and extends over the largest areas. The *wave* movement begins at a center, from which it moves in all directions, like a wave started by dropping a pebble into a pool of water. The earthquake wave, however, differs from the water wave in this: the irregular resistance which it receives from the different layers of rock prevents its moving in a circle, so that its outline soon becomes very irregular. The velocity is very great, often reaching thirty or forty miles a minute. These waves also move more rapidly in hard, elastic rock than in loose gravel or sand. The *vertical* movement acts like the explosion of a mine and usually throws masses of earth and rock into the air. The *circular* or *twisting* movement is the most destructive of all, but it is happily of least frequent occurrence and is confined to very small areas.

The causes of earthquakes are not well understood. Those in volcanic regions are evidently connected with volcanic action, and some are known to be caused by the eruptions which they precede; but those movements more or less remote from volcanic regions and extending over comparatively large areas, such as the earthquake at Charleston, S. C., in 1886, cannot logically be accounted for in this way. The most generally accepted view as to the cause of this sort of earthquake is that the movement of the earth's crust is caused by the contractions of cooling matter in the interior.

When the motion is violent and rapid, the destructive effects of an earthquake are very great. An upward movement of a quarter of an inch will crack brick walls, and one of half an inch will shatter them. When occurring on or near the seacoast, earthquakes often cause great destruction and loss of life by the unusually high waves which they produce in the sea. These roll inland and flood regions that under ordinary conditions are entirely free from the action of the sea. Sometimes large steamers are carried from their moorings and left upon dry land, buildings are destroyed, basins are flooded and hundreds of people are drowned. In some localities changes of level are produced by earthquakes, courses of streams are altered, springs

are dried up and new springs are formed. Fortunately, most shocks are mild, and those of a severe nature seldom occur. The most noted earthquake in the world's history are those at Lima in 1746; Lisbon in 1755, which caused the death of from 40,000 to 50,000 persons; Calabria in 1857; in Ecuador and Peru in 1868; at Charleston, S. C., in 1886; in Italy in 1887, and in Japan in 1891.

The most destructive earthquake in the United States occurred in San Francisco and its immediate vicinity April 18, 1906. A large portion of the business part of the city was destroyed or so damaged as to make rebuilding necessary. The destructive effects extended for 125 miles north and 80 miles south of the city. Several buildings of the Leland Stanford University were damaged or destroyed. The total loss of life was about 500, and over 1500 people were injured. The total property loss was estimated at \$350,000,000. On August 16, 1906, several shocks occurred in South America. Valparaiso, Chili, suffered serious damage and loss of life. Santiago and other towns in the vicinity were also more or less affected.

The greatest earthquake calamity known to history occurred in Calabria, Italy, and the island of Sicily on the morning of December 28, 1908. The cities of Messina, with a population of 100,000, and Reggio, with a population of 50,000, were destroyed, together with twenty or more smaller towns along the coasts of Calabria and Sicily. The loss of life was estimated at from 120,000 to 150,000. The nations of Europe and the United States were prompt in their responses for relief, the Congress of the United States appropriating \$800,000 from the national treasury. This was supplemented by private donations, and over \$3,000,000 was contributed from this country. The cause of this earthquake is supposed to have been a landslide or fault break (see FAULT).

On January 13, 1914, occurred another great earthquake on the island of Sakura, Japan. A volcano which had been inactive for 150 years suddenly burst into activity, wiping out three towns and killing hundreds of people.

Earths, a term applied to certain tasteless, inodorous, dry, unflammable, insoluble substances, of a moderate specific gravity, which constitute by far the greatest part of the gravel and soil that go to make up the mountains, valleys and plains of our globe. They include lime, baryta, strontia, magnesia, alumina and a few others. For a description of the substances named, see their respective titles.

Earth Shine, in astronomy a name given to the faint light visible on the part of the moon not illuminated by the sun. It is most conspicuous when the illuminated part of the disc is at its smallest, as soon after new moon. This phenomenon is popularly described as "the old moon in the new moon's arms" and is due to the light reflected from the earth upon the moon.

Earthworm or **Angleworm**, the popular name for long, cylindrical animals composed of many segments or rings, all of which are much alike. Earthworms move by contractions of successive parts of the body, aided by a double row of bristles on the under side. Their food consists of both vegetable and animal matter, and with it they swallow considerable soil. After digesting the food, they come to the surface of the earth and deposit the refuse and the soil in little heaps, thus by turning the earth over and over, and by bringing fine rich soil to the surface, they are of great service to the farmer. When a heavy rain comes it fills the burrows and forces the worms to come to the surface. Ignorant people then think the worms have rained down.

Ear'wig, a name given in the United States to small centipedes, but more properly applied to the group of insects having leathery upper wings, gauze-like lower wings and long, delicate antennae, and armed on the abdomen with strong pinchers.

Easement, *eez'-ment*, a right of use or enjoyment of lands belonging to another which one may possess through ownership or possession

of other lands. Such are rights of way, the right of light, the right of drainage. Common law classifies easements as *positive*, or *affirmative*, and *negative*. The former refers to the right of physical use of another's land, as a right of way, while the latter requires no such physical use, as the right of light. If an easement is infringed or destroyed, the responsible party is guilty of a nuisance, and this may be



EARWIG
a, larva; b, pupa; c, perfect insect.

abated by legal action or by the act of the person injured. If the offense does not amount to a nuisance, the offending party may be punished for trespass, while if the infringement is only threatened, an injunction may be issued to restrain the acts. Easements may arise either by *grant*, by *prescription*, that is, by immemorial usage, or by *implication*. The last-named arises from the natural presumption that the parties intend to convey such an easement at the time that the land is conveyed. Such an easement would be what is known as a *way of necessity*, that is, the right of ingress and egress to lands that are shut off on all sides.

Easter, the festival commemorating the resurrection of Christ, observed in many branches of the Christian Church. By the first Christians it was considered to continue the feast of the *Passover*, at which the paschal lamb, a symbol of Christ, was sacrificed. Hence, its name in Greek, French and other Romance languages is taken from the Hebrew *pesach*, passover. The English name comes from the Anglo-Saxon *Eostre*, a goddess of light or spring, whose festival was celebrated in April. There was a long dispute in the Christian Church as to the proper time for holding Easter, the Christians of the East celebrating it on the same day as that on which the Jewish Passover fell, that is, the fourteenth of Nisan, while the majority of the Church celebrated it on the Sunday next after this day. The controversy was decided by the Council of Nice in 325, which fixed Easter on the first Sunday after the full moon which happens upon or next after March 21. If the full moon happens on a Sunday, Easter is the Sunday after.

Eastern Question, the name given to the diplomatic and national interests affected by the gradual retrocession of the Turkish Empire in Europe, and the problem of disposing of the territory thus left. Bulgaria, Rumania, Servia, Greece, and Albania are the new states which have naturally arisen on the withdrawal of the Turkish power, and their history, with the respective policies of England, France, Austria and Russia toward them, is the history of the phases of the Eastern Question. Each of the European powers has steadily sought to preserve its own influence in the Balkan peninsula and has tried to prevent the formation of a strong Balkan state which might resist its demands. For this reason the powers created the new autonomous state of Albania at the end of the Balkan War, instead of allowing

Bulgaria and its allies to share the conquered territory among them. Instead of materially increasing the strength of each of the Balkan countries, the war of 1912-1913 merely gave each a few additional square miles and created a new state, even weaker than the rest. The Crimean War, the Russo-Turkish War of 1877-1878, the Armenian massacres of 1896, and the Turko-Grecian War of 1897, are among the notable events connected with the Eastern Question.

Eastern Rume'lia, a division of Bulgaria, formerly a Turkish province. In 1885 a revolution occurred, and the province was annexed to Bulgaria. The chief town is Philippopolis.

Easthamp'ton, MASS., a town in Hampshire co., 4 mi. s. w. of Northampton, on the Boston & Maine and the New York, New Haven & Hartford railroads. It has manufactures of rubber and cotton goods, buttons and other articles. Williston Seminary for boys is located here, and the town has a public library. Easthampton was settled in 1665 and organized as a town in 1809. It was the scene of an indian massacre in 1704. Population in 1910, 8524.

East India Company, a great English company, originally simply a trading association, which played an important part in the history of Hindustan. It was formed in 1590 in London, with a subscribed capital of about \$150,000, for the purpose of trade with the East Indies. A charter was granted to it by Queen Elizabeth in 1600, giving it the monopoly of trade from the Cape of Good Hope eastward to the Strait of Magellan. In 1609 James I renewed the charter and made it perpetual, reserving power to the crown to recall it at three years' notice. Additional power was granted to the company of seizing and confiscating ships and goods of contraband traders, either in the British dominions or in any of the places where they were authorized to trade. The political rights which it held in India made possible oppressive rule there, and this led in 1784 to the appointment of a Board of Control which supervised all acts of the company except the purely commercial. In 1813 the charter was renewed on condition that the right of exclusive trade should be restricted to China, while the Indian trade should be thrown open to all British subjects. The renewal of the company's charter in 1834 took place amid great opposition to their mercantile and even to their legislative privileges, and on the outbreak of the mutiny of 1857 it was felt indispensable to vest the government

of India directly in the Crown. This was accordingly done in 1858. Henceforth the company existed only for the purpose of receiving payment of the dividends due upon capital.

East Indies, the name loosely applied to India, Indo-China and the Malay Archipelago, including the Philippine Islands.

East Liv'erpool, OHIO, a city in Columbiana co., 40 mi. n. w. of Pittsburg, Pa., on the Ohio River and on the Pennsylvania railroad. It is supplied with natural gas and has extensive machine shops and glass factories, many china, porcelain and terra cotta works, and one of the largest potteries in the United States. The place was settled as early as 1795 and incorporated in 1834. Population in 1910, 20,387.

East'on, PA., the county-seat of Northampton co., situated on the Delaware River at its junction with the Lehigh, 65 mi. n. of Philadelphia and 75 mi. w. of New York, on the Lehigh Valley, the Lackawanna, the Pennsylvania and other railroads. The city is connected by bridges with South Easton and with Philipsburg in New Jersey. It is built upon hills sloping toward the river and is surrounded by fine scenery. There is a central public square, and the chief buildings include the public library, an opera house and the buildings of a number of educational institutions, chief among which is Lafayette College, the leading Presbyterian college of Pennsylvania. The chief industries include smelting furnaces, machine shops, shoe factories, planing mills, flour mills, silk mills and factories for the manufacture of automobiles, pianos, organs and other articles. The city is in the vicinity of an important coal region and has a large trade. Population in 1910, 28,523.

East Or'ange, N. J., a city in Essex co., adjoining Newark and 12 mi. w. of New York City, on the Erie and the Lackawanna railroads. It has well-paved and shady streets, many churches and a public library, and is primarily a residence town for Newark and New York City business men. East Orange was a part of Orange until 1863. Population in 1910, 34,371.

East'port, MAINE, a city in Washington co., 190 mi. n. e. of Portland, on Moose Island in Passamaquoddy Bay, and on the Washington County railroad. It is the easternmost settlement of the United States. The city is a port of entry and has a deep harbor. Fishing and sardine canning are important industries, and ship-building is also carried on. Eastport was

settled in 1782. Great Britain claimed the islands in the bay and captured the city in 1814, and held it for four years under strict martial law. Population in 1910, about 5000.

East Providence, R. I., a town in Providence co., across the Seekonk River from the city of Providence, on the New York, New Haven & Hartford railroad. It contains chemical, electrical and wire works, bleacheries and handkerchief and other factories. It was incorporated in 1862. Population in 1910, 15,808.

East Riv'er, a strait in New York, separating New York from Brooklyn and connecting Long Island Sound with New York Bay. It is about 20 miles long, and from $\frac{1}{2}$ mile to $3\frac{1}{2}$ miles wide. The famous Brooklyn suspension bridge spans this river. See NEW YORK (city).

East River Bridge. See BRIDGE, subhead *Suspension Bridges*.

East Saint Louis, ILL., a city in Saint Clair co., on the Baltimore & Ohio, the Chicago & Alton, the Wabash and other railroads, and on the Mississippi River, opposite Saint Louis, Mo., with which it is connected by a long iron bridge. Coal is mined in the vicinity and there are extensive rolling mills, malleable iron works, foundries, machine shops, breweries, glass factories and flour mills. The city contains one of the largest stockyards in the United States and the packing industry is important. East Saint Louis was incorporated as a city in 1865 and has experienced a rapid growth since 1870. Population in 1910, 58,547.

Eat'on, DORMAN BRIDGMAN (1823-1899), an American lawyer and reformer, born at Hardwick, Vt., educated at the University of Vermont and at the Harvard Law School and admitted to the practice of law. He early took special interest in movements for the betterment of municipal and national government, drafted the law establishing the board of health in New York City in 1873 and became one of the members of the first civil service commission. He drafted the national civil service act (the Pendleton Act) of 1883, and became a member of the commission appointed under the act. He was reappointed by President Cleveland and served until 1886. He was the author of several works upon civil government and upon special problems in municipal government.

Eaton, JOHN (1829-1906), an American educator, born in Sutton, N. H., and educated at Dartmouth College and Andover Theological Seminary. He entered the Civil War as chaplain of an Ohio regiment and was promoted until

Eaton

he became brigadier general of volunteers. At the close of the war he became interested in the Freedmen's Bureau, of which he was elected first assistant commissioner. He was later superintendent of public instruction for Tennessee, and in 1871 he was appointed commissioner of education for the United States, which position he occupied until 1886, when he became president of Marietta College. In 1898 he was appointed inspector of education for the island of Porto Rico. Doctor Eaton was the author of numerous reports connected with his official positions and a number of magazine articles of value.

Eaton, MARGARET O'NEILL (better known as Peggy O'Neill) (about 1796-1879), the wife of J. H. Eaton, President Jackson's secretary of war. On account of somewhat questionable conduct in her previous life, Mrs. Eaton was refused recognition by Washington society. President Jackson in his efforts to overthrow the opposition to her effected a reorganization of his cabinet. The event caused important political consequences, since it cemented the friendship between Jackson and Van Buren and alienated Jackson and Calhoun, causing the nomination of Van Buren rather than Calhoun for president by the Democratic convention in 1836.

Eau Claire, *o klair'*, Wis., the county-seat of Eau Claire co., 84 mi. e. of Saint Paul, Minn., at the junction of the Eau Claire and Chippewa rivers and on the Wisconsin Central, the Chicago, Milwaukee & Saint Paul and other railroads. The city is at the head of navigation on the Chippewa and has good water power from both rivers. It is the outlet of the Chippewa lumber district and has extensive sawmills and manufactures of iron and linen goods, furniture, machinery, shoes and other articles. Eau Claire has a public library and Sacred Heart Hospital, and has become a popular summer resort. Population in 1910, 18,310.

Ebers, *a'burs*, GEORG MORITZ (1837-1898), a German Egyptologist and novelist. His scientific publications include *Egypt and the Book of Moses; Egypt, Description, Historical and Picturesque*, and *From Goshen to Sinai*. He is, however, most widely known by his novels, the most popular of which are *An Egyptian Princess* and *Uarda*.

Eb'ony, the name given to the heartwood of various trees of different species, similar in that they all have wood of a dark color. The most valuable is the heartwood of a tree which grows

Eccentric

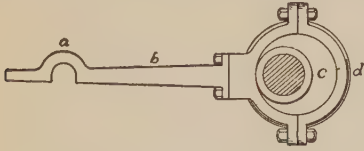
in great abundance in the flat parts of Ceylon and is of such size that logs of its heartwood two feet in diameter and from ten to fifteen feet long are often procured. Other varieties of valuable ebony are obtained from the East Indies. Ebony is hard, heavy and durable, and admits of a fine polish or gloss. The most usual color is black, red or green. The best is jet black, free from veins, very heavy, astringent, and of an acrid, pungent taste. On burning coals it yields an agreeable perfume, and when green it readily takes fire from its abundance of fat. It is wrought into toys and is used for mosaic inlaid work and other ornamental purposes.

Ecarte, *a kahr ta'*, a game of cards played by two persons with a pack from which the cards below seven have been thrown out. Five cards are dealt to each player, two and then three at a time, or *vice versa*, if the dealer wishes. The eleventh card is turned for trumps. If it be a king it counts one to the dealer. If the non-dealer is satisfied with the cards, he leads, but if not, he says "Cards," and then the dealer may play or, if he is not satisfied, each discards as many cards as he likes, and the dealer gives an equal number after the trump has been removed. This continues until one or the other is satisfied with his hand. The one having the king of trumps must play it and score one before the playing begins. It is always necessary to follow suit, if possible, or to trump, the object being to get all the tricks. The cards rank in the following order: king, queen, knave, ace, ten, nine, eight, seven. Whoever wins three tricks out of five scores a point. If he wins all five tricks he scores two points. The game is five points.

Ecbat'ana, an ancient city of Persia, the capital of Media, about 1½ miles from Mount Orontes. The city was situated on a hill and was enclosed by seven walls, and it is said to have been almost thirty miles in circumference. Among prominent buildings were the citadel and the royal palace. The city was a favorite summer residence of the Median, Persian and Parthian kings. History tells us that after the Battle of Arbela in 331 B. C. Alexander followed Darius to Ecbatana and obtained an enormous amount of booty. The city was also plundered by the Seleucidae. After it came into the hands of the Parthians its fall was rapid, and its site to-day cannot be exactly determined, though the present Hamadan is generally considered to occupy the place of the ancient Ecbatana.

Eccentric, *ek sen'trik*, a term in mechanics applied to contrivances for converting circular

into sliding forth and back motion. It consists of variously-shaped disks so attached to a revolving shaft that the center of the disk does not coincide with the center of the shaft. An *eccen-*



ECCENTRIC AND ATTACHMENTS

a, hook or gab; b, rod; c, eccentric; d, strap.

tric wheel is a wheel fixed on an axis that does not pass through the center. Its action is that of a crank of the same length as the eccentricity.

Ecclesiastes, *ek kle'ze as'teez*, the title by which the Septuagint translators rendered the Hebrew *Koheleth* (the gatherer of the people), a symbolic name explained by the design of the book and the dramatic position occupied by Solomon in it; one of the canonical books of the Old Testament. According to Jewish tradition it was written by Solomon; but the best modern criticism has decided that its style and language, no less than its thought, belong to a much later date.

Echidna, *e kid'nah*, or **Spiny Ant-eater**, a genus of Australian toothless mammals, in size and general appearance resembling a large hedgehog, excepting that the spines are longer, and the muzzle is long and slender, with a small opening at the end through which a long, flex-



ECHIDNA

ible tongue can be thrust. The echidna sleeps during the day. It has short, strong legs and its five toes are armed with powerful claws so that it can burrow easily in the ground. It feeds upon ants and other insects, which it catches with its long, sticky tongue. It is nearly allied to the ornithorhynchus or duckbill, and the two form a peculiar class of animals, having in their structure some of the peculiarities of mammals, birds and reptiles.

Echinodermata, *e ki'no dur'mah tah*, the third from the lowest of the seven great branches

into which the animal kingdom is divided. Sometimes the echinoderms are grouped together, but each animal leads its individual life. The five parts of nearly all are arranged on a radiating plan something like the spokes of a wagon wheel, this at one time giving them the name Radiata and causing this class to include the Coelenterata. In some species the covering of the echinoderms is a soft, leathery sack, but in others it is a hard shell. The alimentary canal is separate from the body cavity and bones above and below. Motion and the few special senses are governed by a well-organized nervous system. Around the mouth of the animal is a ring-like vessel which is connected with organs in various parts of the body. This constitutes the water vascular system, by which locomotion and breathing are conducted. Water is taken into the ring and carried thence into minute organs called ambulacra, or short tubular "feet," which are thus thrust forward and outward, in the case of the shelled echinoderms, through small pores in the shell. Generations alternate; the egg from the mature animal producing a free-swimming form which differs decidedly from the adult form that grows out of it. There are about 3000 living species found in all the seas of the globe, but they are most abundant in tropical seas. See SEA URCHIN; STARFISH; CRINOIDEA.

Echo, *ek'lo*, in Greek mythology, a nymph who fell in love with Narcissus and, because he did not return her love, pined away until nothing was left but her voice.

Echo, the repetition of a sound caused by the reflection of sound waves by some moderately even surface, as the wall of a building. The waves of sound on meeting the surface are turned back in their course. In order that the echo may return to the place from which the sound proceeds the reflection must be direct, and not at an angle to the line of transmission, otherwise the echo may be heard by others but not by the transmitter of the sound. This may be effected either by a reflecting surface at right angles to the line of transmission, or by several reflecting surfaces which end in bringing the sound back to the point from which it started. Sound travels about 1125 feet in a second; consequently, an observer standing at half that distance from the reflecting object would hear the echo a second later than the sound. Such an echo would repeat as many words and syllables as could be heard in a second. As the distance decreases the echo repeats fewer syllables, till

only one is repeated. The most practiced ear cannot distinguish in a second more than from nine to twelve successive sounds, so that a distance of not less than sixty feet is needed to enable an ordinary ear to distinguish between the echo and the original sounds. At a near distance the echo only clouds the original sounds, and this often interferes with the hearing in churches and other large buildings. Woods, rocks and mountains often produce wonderful echoes, for which particular localities have become famous.

Eck, JOHANN MAIER VON (1486–1543), a celebrated opponent of Luther. When he was trying to confuse Luther with quotations from the church fathers and councils, Luther quoted history and Scripture and finally said, "You run away from the Bible like the devil from the Cross." Eck at last made Luther declare that under certain circumstances it might be right to disobey the pope and council. Eck then went to Rome in 1520 and returned with a papal bull against Luther, in attempting to publish which he met with violent opposition. In 1530, while at the diet of Augsburg, he made the remarkable admission that he could confute the Augsburg Confession by the fathers but not by the Scriptures.

Eckford, HENRY (1775–1832), an American naval architect, born in Scotland. In 1796 he established himself as a shipbuilder in New York City. He was employed by the United States government during the War of 1812 to construct vessels of war for the lakes and inland waters, and later he became United States naval constructor at the Brooklyn navy yard, where, under his direction, the government built six ships of the line, of which the *Ohio* became the most noted. In 1831 he built a sloop of war for the Turkish navy, and he was preparing to enter the service of that government as chief naval constructor when he died.

Eclectics, a name given to all those philosophers who do not follow one system entirely, but who select what they think the best parts of all systems and combine them into a system. In this century the eclectic method found a notable supporter in the French philosopher, Victor Cousin.

Eclipse, *e klips'*, the hiding of one heavenly body by another or by the shadow of another. Stars and planets may suffer eclipse, but the only eclipses visible to the naked eye are those of the sun and the moon.

An *eclipse of the moon* is occasioned by the interposition of the earth between the sun and

the moon; consequently, all eclipses of the moon happen at full moon; for it is only when the moon is on that side of the earth which is turned away from the sun, and directly opposite, that it can come within the earth's shadow. Further,

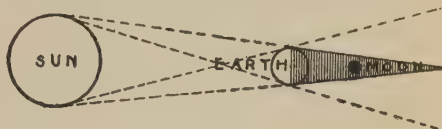


FIG. 1

the moon must at that time be in the same plane as the earth's shadow; that is, the plane of the ecliptic in which the latter always moves. If the moon moved in the plane of the earth's path, there would be an eclipse every full moon, but as the moon's orbit makes an angle of more than 5° with the plane of the ecliptic, it frequently happens that though the moon is in opposition it does not come within the shadow of the earth. In the diagram (Fig. 1) it can readily be seen that to a person on the side of the earth away from the sun, the moon would be in total eclipse for some time. It may also be noticed that to a person on the moon the sun would be in partial eclipse.

An *eclipse of the sun* is the hiding of the whole or part of the sun by the moon as it passes between the earth and the sun; thus, all the eclipses of the sun happen at the time of the new



FIG. 2

moon. If the moon hides the whole face of the sun, the eclipse is *total*; if it hides but a portion of the face, the eclipse is *partial*; if all but a narrow ring is hidden, the eclipse is *annular*. The accompanying diagram (Fig. 2) will explain how an eclipse of the sun is caused. To a person standing on the earth between B and C the eclipse will be total; to one between A and B or between C and D the eclipse will be partial.

An eclipse of the sun begins on the western side of his disc and ends on the eastern; and an eclipse of the moon begins on the eastern side of her disc and ends on the western. The average number of eclipses in a year is four, two of the sun and two of the moon; and as the sun and moon are as long below the horizon of any particular place as they are above it, the average number of visible eclipses in a year is two, one of the sun and one of the moon. Astronomers

predict eclipses with absolute accuracy, and every year they announce where eclipses will be visible. In the United States total eclipses of the sun were visible in 1806, 1834, 1860, 1869, 1878, 1880, 1889, 1900; others will occur in 1918, 1923, 1925 and 1945.

Ecliptic, the sun's path, the great circle in which the sun *appears* to describe his annual course from west to east—really corresponding to the path which the earth describes. The Greeks observed that the eclipses of the sun and moon took place near this circle, whence they called it the *ecliptic*. The ecliptic has been divided into twelve equal parts, each of which contains 30° (See ZODIAC). The position of the planets and the latitude and longitude of the stars are reckoned by the plane of the ecliptic. The points at which the equator and ecliptic intersect are subject to a continual variation, receding westward at the rate of about 50 seconds a year. The angle at which the ecliptic stands to the equator is also variable, and has been diminishing for about 4000 years at the rate of about 50 seconds in a century. Laplace showed, however, that this variation has certain fixed limits, and that after a certain time the angle will begin to increase again. The combined result of these two changes is to cause the pole of the earth not to point constantly to the same spot in the heavens, but to describe an undulating circle round a certain point. This movement, however, is so slow that it takes many thousand years to complete it.

Ecole des Beaux Arts, a *kohl' da bo zahr'*, the French government's school of fine arts, in Paris, perhaps the most important institution of its kind in the world. It was founded in 1648 by Mazarin. Courses are offered in drawing, painting, sculpture, architecture, engraving, modeling and gem cutting. The school of architecture is now one of the most important branches of the Ecole des Beaux Arts. In 1666 the *prix de Rome* was instituted, and competitions for this take place at this school. The competition is open to all artists between the ages of fifteen and twenty-five, whether pupils of the school or not, after they have passed two preliminary examinations. The successful competitors are given an annual allowance from the State for three or four years, two of which must be passed at Rome. There are in the school about 1300 students, most of whom are French. The number of Americans is larger than that of any other foreign nation.

Ecol'ogy, a name rather recently given to that department of botany which treats of plants in their relations to their surroundings, and which deals with such subjects as the distribution of seeds, cross fertilization and the grouping of plants according to soil and climatic conditions.

E'conom'ics. See POLITICAL ECONOMY.

Ecuador, *ek'wah dor*, a country of South America, extending from 1° 45' north latitude to 5° south latitude, lying between Colombia on the n., Peru on the s. and the Pacific Ocean on the w. The eastern boundary is in dispute, so that the exact area is not known. The area usually given, however, is 115,650 square miles, making the country a little larger than Arizona.

SURFACE AND DRAINAGE. The surface of Ecuador is divided into three regions: the lowland region along the coast; the highlands, including the mountains and plateaus in the central portion of the country, and the extensive plains on the east. The coast region is comparatively narrow, and from this the highlands rise abruptly to the plateau, upon which two parallel ranges of the Andes rest, extending north and south. Among the groups of mountains of this region are sixteen peaks having altitudes ranging from 15,000 to 20,500 feet. The most noted of these are Chimborazo, 20,500 feet, and Cotopaxi, 19,600 feet, as far as known the highest active volcano in the world. Near the northern boundary these parallel ranges converge and form several elevated tracts, known as *knots*, the most prominent one being in the southern part of Colombia. Toward the south there is a similar convergence, and between these points are a number of plateau valleys, the most important being those of Quito, Hambato and Cuenca. In elevation these range from 8000 to 14,000 feet. Their soil is fertile, and they are the home of the greater part of the population of the country. East of the Andes the land slopes to the great plain, which is continuous with the basin of the Amazon.

Most of the rivers are rapid mountain streams and are of little value for navigation. However, the Amazon, known in this part of its course as the Marañon, is navigable to the point nearest to the southern boundary, and some of the larger tributaries can be ascended a part of the way with small boats. The most important of these are the Santiago, the Japura and the Napo. Some of these streams flow for a part of their course through Peru. The

principal rivers flowing into the Pacific are the Mira, Esmeralda and Guayas.

CLIMATE. Being directly under the equator, Ecuador has a tropical climate, but owing to the varying elevations, this is greatly modified, so that actually within the country all grades of climate, from the tropical to the frigid, are found. The lowlands on the coast are exceedingly hot, moist and in many localities unhealthy; and the plains on the east are hot and comparatively dry, while the plateau valleys have a temperate and salubrious climate, in which spring reigns throughout the year. Above these, the highest altitudes of the mountains have a rigorous, cold climate, and most of the summits are crowned with perpetual snow. The rainfall is ample for agricultural purposes, and throughout the country there are two seasons, known as the wet and the dry, though in the plateau valleys these are not distinctly marked.

MINERAL RESOURCES. Ecuador has rich deposits of minerals, consisting of gold-bearing quartz, silver ore, deposits of copper, iron, mercury and petroleum. Emeralds and other precious stones have also been found within the country. However, owing to lack of transportation facilities and the lethargy of the people, none of these has been worked on an extensive scale.

INDUSTRIES. Agriculture is the leading industry and is carried on chiefly in the plateau valleys. Wheat and barley sufficient for home needs are raised, and in some districts corn is successfully cultivated. Cattle are raised on the plains, and on the west side of the mountains there are many large tracts devoted to the cultivation of the cacao tree. Coffee is also raised upon the lowlands. Cacao, cinchona bark, sarsaparilla, india rubber, coffee, hides and sugar are the agricultural and forest exports. Manufactures are few and are confined almost entirely to domestic industries, except the manufacture of Panama hats, which are made from the midrib of the leaf of the screw pine. This work is done almost entirely by the indians, and because dampness is essential to the best results, most of the weaving is done at night.

Transportation facilities are very poor. The only carriage road is from Quito to Guayaquil and has a length of about 125 miles. There is also a line of railway connecting Duran, opposite Guayaquil, with Guamote, 125 miles distant. The country contains about 1250 miles of telegraph lines. Throughout the interior

all goods are carried upon pack animals, and lack of transportation facilities prevents extensive commerce with foreign countries. Most of the foreign trade is with France and Great Britain.

INHABITANTS AND LANGUAGE. Fully one-half of the people of Ecuador are indians. These belong to two or three different nationalities, but those descended from the ancient Incas far outnumber the others. These indians have partially adopted the manners and customs of civilization. They are peaceable and industrious and are generally devoted to tilling the soil, raising live stock and manufacturing Panama goods. They speak the Quichua language. Aside from the indians the inhabitants consist of Spaniards and Creoles, who are a mixed race descended from Spaniards, negroes and people of other nationalities. Spanish is the prevailing language among these people; and it is the official language of the government.

GOVERNMENT AND RELIGION. The government is republican in form. The chief executive is a president, who is elected by direct vote for four years. The legislative power is vested in a Senate and a Chamber of Deputies, which corresponds to our House of Representatives. The senators are apportioned two to each province and are elected by direct vote for a term of four years, while the members of the lower house are elected for a term of two years. The local government of each province is administered by a governor. The Roman Catholic religion prevails and is embraced by nearly all the inhabitants.

Education is in a backward state. There are few public schools and no advanced educational institutions of importance.

CITIES. The chief towns are Quito, the capital, and Guayaquil, the chief seaport, each of which is described under its title.

HISTORY. Ecuador was a part of the empire of the Incas, and the country still contains remains of roads and other public works constructed by these people before they were conquered by the Spaniards. For some time after the conquest it was under the government of the viceroy of Peru. In 1822, along with other Spanish colonies, Ecuador gained its independence and became a part of the Republic of New Granada, now Colombia. This union was dissolved in 1829, since which date Ecuador has been an independent state. Population, estimated at 1,400,000.

Ed'da, the name given to two ancient Scandinavian works, known respectively as the *Elder*, or *Poetical Edda*, and the *Younger*, or *Prose Edda*. The first of these was compiled probably sometime between the tenth and the thirteenth centuries, and consists of a collection of thirty-three songs which treat of the Scandinavian gods and heroes. The *Younger Edda* presents a kind of synopsis of the Northern mythology, with a treatise on the poetry and versification of the skalds, or ancient poets. It is supposed to have been written in the thirteenth century, but was first published in the seventeenth.

Ed'dy, CLARENCE (1851-), an American organist and composer, born at Greenfield, Mass., and educated in America and in Germany. On his return to the United States in 1875 he settled in Chicago, becoming organist, successively, in several of the foremost churches. He was soon considered the leading organist in the West, and even in America, and later he was recognized, as both artist and composer, by foreign critics.

Eddy, MARY BAKER (1821-1910), the discoverer and founder of Christian Science, born at Bow, N. H., July 16, 1821. She received her early education from her brother, Albert Baker, and at a private school in Tilton, N. H. Always thoughtful and religious, she early united with the Congregational Church, of which she remained a member until after her discovery of Christian Science. Of this discovery, which came to pass when she was living in Lynn, Mass., she wrote: "During twenty years prior to my discovery I had been trying to trace all physical effects to a mental cause; and in the latter part of 1866 I gained the scientific certainty that all causation is Mind and every effect a mental phenomenon."

In 1875 Mrs. Eddy published *Science and Health with Key to the Scriptures*, the Christian Science text-book, which has been through many editions and has been translated into German. Among her works written later are *Miscellaneous Writings*, *Unity of God*, *The Church Manual*, *Retrospection and Introspection*, *Rudimental Divine Science*, and *Pulpit and Press*. In 1879 she organized the Church of Christ, Scientist, which in 1892 was reorganized as the First Church of Christ, Scientist, in Boston, Mass. In 1881 she opened the Massachusetts Metaphysical College, the only institution of this kind having a charter from the Commonwealth. Mrs. Eddy founded the periodicals of the denomination now issued by the Christian Science Publishing So-

ciety from its building in Boston, including the *Christian Science Journal*, a monthly; *Der Herold der Christian Science*, a German monthly; the *Christian Science Sentinel*, a weekly; and the *Christian Science Monitor*, an international daily.

When a young woman, Mrs. Eddy was married to George Washington Glover and removed with him to Charleston, South Carolina, where he died. In 1877 she married Dr. Asa G. Eddy, who was associated with her in the work of Christian Science.

For a number of years, Mrs. Eddy lived in comparative retirement at Concord, N. H. In 1908 she went to Chestnut Hill, a suburb of Boston, where she remained until her death in 1910, loved and revered by a vast multitude of people. Unlike many reformers, Mrs. Eddy was privileged to see the fruition of her work in the wide acceptance of her teachings. Before her death she was recognized as one of the world's great religious leaders. See CHRISTIAN SCIENCE.

E'den, in biblical literature, the country where man first resided. Much has been written upon the probable locality of Eden, but writers fail to agree in establishing its boundaries, though nearly all concur in locating it somewhere near the head of the Persian Gulf, probably in the valley of the Euphrates, as this country conforms more closely than any other part of the world to the description given in Genesis.

E'denta'ta, or toothless animals, a large and varied order of mammals, which is not happily named, for some of them have teeth. All are more or less perfectly covered with coarse hair, which in some is united into plates that make a protective armor. Their limbs are clawed. The Edentata are scattered over all of the grand divisions excepting Europe. In South America are found the sloth and the great ant-eater; in South Africa, the aard-vark; in America, from Texas southwestward, the armadillo; and in Asia and Africa, the pangolin. These may be considered representative animals of the order.

Ed'gar Ath'eling (about 1057-about 1120), grandson of Edmund Ironside. After the Battle of Hastings, Edgar was proclaimed king of England by the Saxons, but William the Conqueror retained the power. Having been engaged in some conspiracy against the king, Edgar was forced to seek refuge in Scotland, but he became reconciled to William and was assigned a pension. Afterward, with the sanction of William Rufus, he undertook an expedition to Scotland



MRS. MARY BAKER G. EDDY

Edict of Nantes

for the purpose of displacing the usurper of the Scottish throne in favor of his nephew Edgar.

E'dict of Nantes, *nahNt*. See NANTES, EDICT OF.

Edinburgh, *ed' n bur' o*, the capital of Scotland. It is picturesquely situated, being built on three eminences, surrounded on all sides by lofty hills, except on the north, where the ground slopes gently toward the Firth of Forth. It is divided into an Old Town and a New Town, and between these runs Prince's Street, one of the finest promenades in the world. Through the Old



Town runs Canongate Street, rising gradually for almost a mile, and parallel with this is Cowgate Street. On the east, Calton Hill, 349 feet high, overlooks the city. Near by are Salisbury Crags, and directly behind this a rocky hill, Arthur's Seat, 796 feet high.

Among the notable buildings are the ancient Parliament House, now the seat of the Supreme Court of Scotland; Saint Giles's Church, or Cathedral, an imposing edifice in the later Gothic style, recently carefully restored; the Tron Church; Victoria Hall, with a fine spire, and the Bank of Scotland, besides some of the old family houses of the Scottish nobility. Sir Walter Scott's monument is in the New Town. In the Old Town the most remarkable public building is the Castle. In an apartment here are kept the ancient regalia of Scotland. About a mile northeast of the castle is the celebrated royal Palace of Holyrood, which had its origin in the abbey founded by David I in the twelfth century. No part of the present Palace is older than the time of James V (1528). In the northwest angle of the building are the apartments which were occupied by Queen Mary, nearly in the same state in which they were left by that unfortunate princess.

Among the various educational institutions are the University of Edinburgh, one of the most famous in Europe; the Advocates' Library, the

Edinburgh

largest library in Scotland, containing upward of 250,000 printed volumes and 2000 manuscripts, and a fine public library erected by Andrew Carnegie. Besides the buildings already noted, Edinburgh possesses a large number of important edifices and institutions, chief among which are the Royal Institution, the National Gallery of Scotland, the Museum of Science and Art, the new Episcopal Cathedral of Saint Mary's and the Edinburgh Royal Infirmary, one of the best hospitals in Europe. This city is the headquarters of the book trade in Scotland and is the seat of the chief government departments.

Edinburgh is not an important manufacturing town; it has, however, various industries, including brewing, printing and publishing. The port is Leith.

The origin of Edinburgh is uncertain. Its name is thought to be derived from Eadwinsburgh, the Burgh of Edwin, a powerful Northumbrian king, who absorbed the Lothians in his rule. The town was made a royal burgh in the time of David I; but it was not till the fifteenth century that it became the recognized capital of Scotland, under the Stuart kings. Population in 1911, 320,315.

Edinburgh, ALFRED ERNEST ALBERT, Duke of (1844-1900), second son of Queen Victoria, also earl of Ulster, earl of Kent, duke of Saxony and duke of Saxe-Coburg-Gotha. He was educated by special tutors, and at the age of fourteen he joined the royal navy and served in various foreign stations. In 1862 he declined the offer of the throne of Greece. In 1867 he was appointed to the command of the frigate *Galatea*; in 1882 he was made vice admiral and in 1886 he became admiral of the squadron in the Mediterranean. He married in 1874 the grand duchess Marie, only daughter of Alexander III, emperor of Russia.

Edinburgh, UNIVERSITY OF, a university established at Edinburgh, Scotland, in 1582, by a charter granted by James VI. The government is vested in a senate, the university court and a general council. The general council consists of the chancellor, members of the university court, the professors and all graduates of the university. Four faculties are maintained: liberal arts, divinity, law and medicine. A special school is provided for women, who are now allowed to graduate in art, science and medicine. The medical department has attained a world-wide reputation for its efficiency. The faculty numbers 125 and there are over 3100 students enrolled. The library contains

220,000 volumes and many manuscripts. In addition to this, there is a theological library of about 10,000 volumes.

Edinburgh Review, a famous periodical, founded in October, 1802, by Francis Jeffrey, Sidney Smith, Francis Horner, Henry Brougham and others. It was the first of the great critical periodicals and had from the outset a marked influence on literary life in England.

Edison, THOMAS ALVA (1847-), an American electrician and inventor, born at Milan, Ohio. He received a common school education and began work as a train boy on the Grand Trunk Railway. He learned printing and edited and printed the *Grand Trunk Herald* in the baggage car of the train on which he was employed. A station master whose child he had rescued taught him telegraphy, and he soon became a very rapid and skillful operator. He was employed by the Western Union Telegraph Company, and there he began the series of inventions which have brought him fame and fortune. After brief sojourns in several Western cities he settled in Boston. Carrying on his experiments there, he was able to overcome the difficulties connected with sending two messages in opposite directions at the same time over the same wire, and invented the duplex telegraph, which has proved a highly valuable improvement. In 1868 Edison happened to be in New York when the indicator at the Gold and Stock Exchange broke down. He volunteered his services and succeeded in adjusting the instrument.

His laboratories were first located at Menlo Park, N. J., and later he established headquarters at Orange, N. J., where he afterward lived. A score of skilled investigators were employed in his factories until 1876, when Mr. Edison, because of declining health, gave up his manufacturing interests. He took out nearly four hundred patents. He devoted himself mainly to electricity, but had marked success in other lines. Some of his most valuable inventions, patented in other countries as well as in America, are the phonograph, an instrument for making permanent records of articulate sounds; the microphone, which detects the faintest sound; the megaphone, by the aid of which ordinary sounds can be heard at a great distance; the microtasmeter, which records minute variations in temperature. His incandescent lamp combines purity, steadiness, safety and simplicity and is the most widely used of all of his inventions. The kinetoscope, which is one of his latest

inventions, is an apparently moving panorama, or machine for throwing moving pictures. Edison clearly holds the foremost position among inventors of the nineteenth century. His influence on the industries and commerce of America cannot be overestimated.

Ed'monton, the capital of the Province of Alberta, Canada, 800 mi. n. w. of Winnipeg and 525 mi. e. n. e. of Vancouver. The city is situated on the Canadian Northern, the Canadian Pacific and the Grand Trunk Pacific railways. It is in the midst of a fertile agricultural region, which, however, is only partially developed. It is also in the center of a territory which furnishes cheap and abundant fuel and valuable raw materials in many lines, affording opportunity for the development of manufacturing enterprises, of which a few are already established. The city has excellent transportation facilities and is the distributing center for the central and northern parts of the province, and also for the north of Alberta. It owns most of its public utilities and its government is modeled upon the most modern plans. Population in 1911, 24,900.

Ed'mund I (922-946), king of England, grandson of Alfred the Great; he succeeded his brother Athelstan in 940. He put down a serious revolt in the north and conquered Cumbria, which he bestowed on Malcolm, king of Scotland. He was slain at a banquet.

Edmund II, surnamed *Ironsides* (about 981-1016), king of England, the eldest son of Ethelred II. He was chosen king in 1016, Canute having been already elected king by another party. He won several victories over Canute, but was defeated at Ashingdon, in Essex, and was forced to surrender the midland and northern counties. He died after a reign of only seven months.

Edmunds, GEORGE FRANKLIN (1828-), an American statesman, born in Richmond, Vt. He became a lawyer and was a representative in the legislature from 1854 to 1859, serving three years as speaker. In 1861 he was elected to the state senate, and in 1866 he became United States senator, which office he held by constant reelection until 1891. He gained note as the champion of a bill for the suppression of polygamy in Utah, passed in 1882. He was a candidate for the presidential nomination in the Republican national conventions of 1880 and 1884. After his retirement he became eminent as a constitutional lawyer.

Edom (in the New Testament, Idumaea), in ancient times a country lying to the south of



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THOMAS A. EDISON

Palestine. It was the mountainous tract stretching between the Dead Sea and the Gulf of Akabah. The chief city in this region was Bozrah, which now presents remarkable ruins.

Education (from the Latin *educare*, to lead forth), in its broadest sense, the art of developing and cultivating all the powers of man; in a narrower sense, and that in which the term is ordinarily used, the development and cultivation of the intellectual powers. Education is as old as the race and has always had for its purpose the supplying of some human need; therefore almost every conceivable phase of the art has been developed. These phases have been variously classified at different periods of history and by different authorities. The following divisions are those most generally accepted by the best modern authorities.

When applied to the development of the different powers of the individual, education is divided into physical, intellectual and moral. *Physical education* pertains to the development of the body and has for its purpose the perfecting of the physical powers, so as to give the individual control over his bodily powers and to keep him in health. When specialized, this education becomes *athletic training*. *Intellectual education* has for its aim the development of the intellectual powers and is the phase usually understood when education is mentioned without qualification. Courses of study pertain more extensively to this phase of education than to any other. *Moral education* deals with the training of the will and the education of the conscience. It is so closely interwoven with intellectual education that in practice the two are inseparable. When extended to educating the individual concerning the relation between himself and a supreme being, it becomes *religious education*, which is the highest phase that the art can assume.

When considered from the point of view of the grades and kinds of instruction, education is divided into primary, secondary, higher, professional and special education. *Primary education*, in the broadest application of the term, includes all instruction given in common and graded schools below the high school or academy. In its restricted application, it includes only the work of the first three years of the graded school course. *Secondary education* includes instruction in high schools, academies and other schools of similar grade. The term applies to all instruction, except professional and special, between the graded school and the college.

Higher education includes instruction in colleges and universities, and in many of its branches it becomes highly specialized. *Professional and technical education* has for its purpose the training for special vocations, such as medicine, law or engineering. Many professional schools are organized as departments of colleges and universities. *Special education* includes those means of instruction provided for special classes, such as the blind, deaf and dumb and feeble-minded. In the United States this phase of education is usually provided for by institutions supported by the different states. There are also, of course, many private schools for these special classes.

EDUCATION, HISTORY OF. Education in some form has existed since the coming of man, and each tribe has had its form of training, designed to fit the child for the peculiar life which he was to live, still these early efforts do not merit a place in a brief treatment of the subject. Such a treatment must necessarily begin with the systems of the earliest civilized nations. The history of education may be most logically treated under the following divisions: I. The Oriental nations. II. The ancient classic nations. III. Christian education in Europe. IV. Education in the United States.

I. THE ORIENTAL NATIONS. The earliest schools which deserve mention are those of Egypt, China, India and Persia. In these nations, as in all others, the systems of education are inseparable from the prevailing religion of the people. Worship of ancestors among the Chinese made their system of education ancestral in character and caused the family to be responsible for the training of children. Among the people, education has ever been the means of advancement, and government positions are open only to those who pass severe examinations which are managed by government officers. The caste system of India developed a similar system of education. Parseeism, the prevailing religion among the Persians, resulted in a system of training for which the State was responsible after the child was seven years old. Persian education taught a genuine system of morals, instead of external formalism. In ancient Egypt education was under the control of the priests. The common people had little training, save that which the children and youth obtained at home, and this pertained almost wholly to their daily occupations. In all these systems, the education of women was sadly

neglected. Each system had for its object the making of the individual subservient to dogmatic authority, the part of a system, either religious or political.

In marked contrast to the educational systems of other Oriental nations was that of the Israelites. They believed themselves to be the chosen people of Jehovah and that it was their divinely appointed mission to preserve the knowledge of the true God among idolatrous nations. Education was conducted by the family, and the father was the teacher. The boys were taught reading, writing and numbers, and also a trade; the girls were trained in household occupations, and both sexes were instructed concerning their religious duties. Hebrew education has been influential in shaping the later educational systems of Europe, and it has preserved the Jews as a separate and distinct race for more than 4000 years.

II. THE ANCIENT CLASSIC NATIONS. The educational systems of Greece and Rome differed from those of the Oriental nations in that they gave attention to the development of the individual. Their system did not fit man merely to become a member of a family, a state or a caste, but he was to choose his vocation and to aspire to the highest positions in politics, art and literature.

Greece. The two systems of Grecian education deserving notice are the Spartan and the Athenian.

Spartan education was almost entirely physical and essentially military; its highest aim was the making of good soldiers.

Athenian education was a common affair of the family and the State. Its aim was the perfect Athenian or the perfect Greek. To the physical training of Sparta it added intellectual, moral and aesthetic culture. It was more complete than the systems that preceded it and in some respects approached the modern systems of Europe and America. See ARISTOTLE; PLATO; SOCRATES.

Rome. Until after the introduction of Greek culture, Roman education was extremely practical and excluded everything tending to aesthetic culture. There were no state schools, and the education of the youth depended upon the family; consequently, children of poor parents received little or no training. Both boys and girls were educated, and to Rome is due the inauguration of that movement for the elevation of women which the English-speaking countries are destined to complete. The introduction of

Greek art and literature extended the education of the wealthy classes to include these subjects. Rome gave more attention than previous nations to the science and art of teaching, and the writings of Cicero, Varro, Seneca, and especially Quintilian, contain some excellent educational theories. Roman education was an advance upon Athenian and was a step nearer that of modern times.

III. THE CHRISTIAN ERA IN EUROPE. This era is divided into two periods, the period previous to the Reformation, and that following the Reformation.

Early Period. During the first centuries of the Christian dispensation, education received little attention. Christianity taught a new system of morality and set before its followers ideals in marked contrast to those of the pagan world. The early Christians were of the uneducated classes; besides, they were persecuted to such an extent that they had no opportunity for study or contemplation, aside from that given to their religion. These conditions tended to the development of asceticism, and until after the tenth century the study of the literature of the ancient classic nations was considered detrimental to the best interests of the Church and of the students. Education was confined to the monks, and schools were accessories of the Church. Later, monasteries were established, and in these a few monks began again the study of the classics. They made copies of the ancient manuscripts, and it was through the copies, treasured up in the early monasteries, that these masterpieces of literature were preserved to the centuries that followed. Some monasteries had day schools in which children were taught to read and write.

The most influential movements in the interests of general education were made by the great rulers Charlemagne and Alfred. Charlemagne desired to rule over a civilized and educated people, and to this end he greatly extended the educational facilities of his empire. The sphere of the parochial school was enlarged and local priests were required to teach, in addition to religion, reading, writing, arithmetic and music. Alfred the Great believed that all men should be free and that education was essential to the maintenance of this freedom. He therefore sought to establish schools throughout his kingdom, in which reading and writing could be taught. The successors of these great leaders, however, were unable or unwilling to carry out their plans, and the

movement was not productive of permanent results.

In the latter half of the Middle Ages, there arose a constantly increasing demand for secular education. Industrial conditions made a knowledge of reading, writing and arithmetic imperative among merchants and artisans. Out of this demand arose the forerunners of the public schools of to-day. They were known as the burgher, or town, schools. While these schools were secular, they were, nevertheless, under the control of the clergy. Reading, writing, arithmetic, geography, history and natural science were taught, and Latin was sometimes introduced. In the twelfth century there was a universal intellectual awakening. This resulted in an age of Scholasticism, in which the study of reasoning and the practice of subtle dialectics occupied the attention of learned men. This led to no new thought, but made its devotees blind followers of dogmatic authority.

All developments of the Middle Ages gradually contributed to the growth of the scientific spirit, but the influence of the Crusades and the rise of the Mohammedans were the two sources from which this spirit received its greatest impetus. The most important result of the newly awakened scientific spirit was the founding of great universities by both the Church and the State. Some of these, such as the University of Paris and that of Heidelberg, have exerted an immeasurable influence on each succeeding century and are now among the strongest educational institutions of the world. See HEIDELBERG, UNIVERSITY OF; PARIS, UNIVERSITY OF.

The influence of all these movements culminated, during the last years of the Middle Ages, in the Renaissance, in which there was a general revival of learning; the people of Europe emerged from the despotism of ecclesiastical and feudal institutions, and independent nations were established.

The Reformation. The Reformation (See REFORMATION) is the greatest event in modern history. It wrested thousands of communicants from the Church and arrayed them in opposition to it and at the same time so stirred the Church itself that from the agitation came one of the greatest educational movements of history. Protestantism was based on two principles: 1, Man is justified by faith alone. 2, The Bible is the only guide in religious faith and practice. If men were to follow the Bible, they

must be able to read it, and from this necessity sprang those schools in which children were taught to read their mother tongue. The system, however, was soon carried far beyond the original purpose of educating merely for the sake of the Church. Girls as well as boys were to be educated, the schools were to be maintained at public expense and the brightest pupils were to be trained for teachers. What Luther began in the sixteenth century Comenius extended in the seventeenth. By the emphasis which he placed on training the powers of observation, he laid the foundation of modern methods of instruction in elementary schools, as Bacon's inductive philosophy laid the foundation for later methods of scientific investigation.

The Catholic Church, for the purposes of preventing further dissension among its members and of counteracting the influence of the Protestant schools, founded the order of Jesuits (See JESUITS). This order, under the leadership of Ignatius Loyola (See LOYOLA, IGNATIUS), became one of the strongest religious organizations the world has ever known. Through its exertions schools of a high grade were universally established and maintained. Thus the Reformation led to the extension of educational advantages to the common people, both of Catholic and Protestant faiths.

Early in the sixteenth century John Sturm of Prussia perfected in Strassburg a system of graded instruction, similar in plan to that now in vogue in the leading countries of Europe and in the United States. The great English schools at Eton, Winchester and Westminster were based upon Sturm's model, and, with such modifications as the progress of thought has made necessary, they still follow it.

During the sixteenth and seventeenth centuries, both Catholics and Protestants gave much attention to the universities; those already established were strengthened and many new ones were founded. But these institutions were conservative and were very slow to make any changes. The seventeenth century saw a strong reaction against the courses of study in vogue during the sixteenth, as well as the establishment of broader courses, including more practical subjects. There was also great improvement in the methods of instruction, based on the teachings of Bacon and Comenius. In the eighteenth century, the foundations thus laid were extended and to some degree perfected, and there was a gradual extension of the primary

school to include the children of all classes. During the nineteenth century, the public school systems of all the leading countries of Europe were perfected, and in most cases a perfect articulation exists between the primary and secondary schools, and between the secondary school, or gymnasium, and the university. During the four centuries following the Reformation, public education was gradually removed from the control of the Church to that of the State. But the parochial school and the denominational seminary and university have nevertheless remained and are still important factors in the educational systems of all civilized countries.

IV. THE UNITED STATES. *The Colonial Period.* The American colonists were interested in education, but local conditions and the classes of settlers in each section developed widely different systems in the New England and Southern colonies. New England was settled by the sturdy middle class. Nearly all were educated, and many were college bred. The people of Massachusetts believed that public schools were necessary for both religious and secular purposes. In 1647 the Massachusetts General Court passed a law providing that every town of fifty or more families should establish a primary school, the expense of maintaining the same to be met by the parents of the children or by the settlers in general. It was also ordered that every town of one hundred or more families should maintain a grammar school which should fit its students for college. The common school of Massachusetts furnished the model after which the public schools of the northern colonies were patterned.

Harvard College was opened in 1638 and graduated its first class in 1642. The enactment of the School Law of 1647 placed this institution in close relationship to the common schools. Harvard was the forerunner of several similar colleges which have attained more than a national reputation. Yale was founded in 1701, Williams in 1755, Bowdoin in 1764 and Dartmouth in 1769. Each of these institutions is described under its title.

Conditions in the Southern colonies developed an entirely different educational system. The large estates caused the country to be sparsely settled and made gatherings of the people difficult. The township, as a civil organization, was unknown, and the parish was the unit for local administration. Moreover, the most influential settlers came from the aristocratic class in Eng-

land and did not consider the education of the common people to be important. Elementary education was consequently left to the care of the family. The children of the wealthy were taught by private tutors, and those of the poor were left to grow up in ignorance. In these colonies public attention was given to higher education. William and Mary, the second oldest college in the United States, was founded at Williamsburg, Va., in 1661, and King William School, which afterwards became Saint John's College, was established in Maryland in 1694. These schools were typical of others established in the South as occasion required.

New York, Pennsylvania and the other colonies gave early attention to the education of the common people, on plans similar to those of the New England colonies. Before the Revolutionary War, almost every colony had a well-defined policy in regard to education.

The National Period. The national government left public education to the care of the several states. In the original states, the systems already established were continued, while the territories formed systems modeled after those in the states from which a majority of the settlers came. The most important causes in bringing education in the United States to its present degree of efficiency were (1) the congressional land grants, (2) the free school system, (3) the establishing of state universities and agricultural colleges and (4) the organization of a national bureau of education.

(1) Congressional Land Grants. The first provision for government aid to education was in the ordinance for the organization of the Northwest Territory, passed in 1785, which provided that the sixteenth section of every township should be reserved for common schools. This provision was confirmed in the Ordinance of 1787 and later by the national government; and the income from the sale or lease of these lands constitutes an important part of the permanent school fund of the states formed out of the territory (See ORDINANCE OF 1787). Congress made a similar grant to all territories afterward organized, so that each state admitted since 1799 has had the benefit of a land grant. In 1848 the grant was extended to include the thirty-sixth section, and all states admitted since that date have had two sections from each township for common school purposes. Several states have had their fund increased by large grants of swamp lands. Each state has entire control of its school lands. In some, the lands are sold

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and the funds invested where they will pay the largest dividends; in others, they are leased, and the annual rental constitutes part of the distributable fund, a portion of which goes to the support of every common school in the state.

(2) Free Schools. While the common school was established by the assembly of Massachusetts with the intention of making instruction free, it was a long time before this ideal was realized throughout the country. As late as 1865, tuition, in the form of rate bills, was collected in New York, Connecticut, New Jersey, Rhode Island and Michigan and the practice did not wholly disappear until 1871. While every community provides elementary instruction at public expense, there is still a divergence of opinion in different states as to the extent to which this practice should be carried, the tendency in the newer states being towards a broad application of the plan. In many of these, free instruction extends through the state university, and in all states it extends through the high school.

(3) State Universities. The land grant of 1787 set aside two townships in every state for a university. This amount was increased at different times by state and national grants, until each of the states admitted after the adoption of the Constitution has a liberal income for a state university. Some of these universities have attained more than a national reputation, and their collective influence on education in the country is beyond measure. They have stimulated secondary schools, elevated educational ideas and made it possible for thousands of young men and women to obtain a college education who would otherwise have been deprived of the opportunity. The agricultural colleges, supported in part by the state and in part by the national government, are usually connected with the state university. See AGRICULTURAL COLLEGE; UNIVERSITY, subhead *American Universities*.

(4) Bureau of Education. In 1867 a national bureau of education was established and made an office in the department of the interior. The bureau is in charge of the United States commissioner of education, who collects educational statistics and disseminates a large amount of valuable information through his reports and through circulars. The work of the bureau is advisory, but it has rendered important service in securing more uniform systems of education in the different states and also in giving valuable

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information on methods of school management and instruction.

The United States has no national system of education, and the national government has no authority over the public school systems of states; nevertheless, the various state systems are now so similar in their plan of grading and the scope of their instruction as to form, collectively, a national system that is winning the admiration of the world.

See COMMON SCHOOLS; EDUCATION, NATIONAL SYSTEMS OF; PEDAGOGICS. Consult Painter's *History of Education*; Compayre's *History of Pedagogy*; Quick's *Educational Reformers*; Oscar Browning's *History of Educational Theories*; Boone's *History of Education in the United States*.

Education, COMMISSIONER OF, the officer at the head of the Bureau of Education in the United States. The office was established in 1867, and Henry Barnard (See BARNARD, HENRY), was appointed first commissioner. The appointment is by the president with the consent of the Senate. The chief duty of the commissioner is to collect educational statistics and give such information relative to the inspection, organization and management of public schools and methods of educating as will be of assistance in improving public education throughout the country. The commissioner publishes biennial reports, which embody his recommendations, together with much valuable information concerning the educational systems and methods of teaching, not only in the United States but in other countries.

Education, COMPULSORY. The right of the state to educate the child for citizenship has been recognized from ancient times. The best example of compulsory education among the early nations is the system adopted by the Spartans (See EDUCATION, HISTORY OF). Their education of boys was primarily military and had for its purpose the making of soldiers. But from compulsory training in military affairs to compulsory training in other lines was an easy step, and Athens extended her training to include other subjects than those dealing with war.

As the term is now applied, *compulsory education* means compelling the attendance of children of school age, usually between six and fourteen or six and sixteen years of age, upon the elementary schools, public or private, for a specified number of months each year. Laws compelling such attendance are in force in Great

Britain, Germany, Switzerland, Norway, Sweden, Denmark and France and are on the statute books of most other European countries, but are not rigidly enforced. In the United States compulsory attendance measures are almost as old as the public school system, but state laws for the purpose did not receive general attention until the last half of the nineteenth century. Most of the states now have stringent laws requiring parents to send children to school and providing for fines, and in some cases for imprisonment, as penalties for failure to comply with the law. Children who have acquired a knowledge of the branches taught in the common schools, defectives and those in ill health are exempt. Compulsory education laws are necessary because of the increasing tendency to employ children in mines, factories and large stores. In the large cities these laws are quite rigidly enforced, but in the rural districts and in most of the smaller towns the authorities are usually indifferent.

The laws are enforced by truant officers, who are appointed by the local board of education. These officers have authority to arrest any child to whom the law applies and commit him to school in his district. If, after warning, the parents do not keep their children in school, the truant officer has authority to have such parents arrested and brought before the local court for trial. In large cities truant schools, in which habitually truant pupils can be confined, are established.

Education, NATIONAL SYSTEMS OF. In nearly all countries the systems of public instruction are managed directly by the national government. The most noted exceptions to this rule are the United States and Switzerland.

GREAT BRITAIN. The general oversight of public instruction in Great Britain is under the Board of Education for England and Wales. This board is comprised of the lord president of the council, the principal secretaries of state and the chancellor of the exchequer. In 1902 an educational law which provides for the control of the elementary schools outside of London was passed. This placed the elementary schools in the immediate charge of the county council, or council of the county boroughs. Previous to this the schools supported by public funds, and known as the *provided* schools, were the only ones receiving government aid, while the schools established by different denominations, and known as the *unprovided* schools, contained

nearly as large a number of pupils. By the new law both classes of schools receive the same support from the government. The county council is obliged to provide as many schools as are necessary in the territory under its jurisdiction and support them from the general fund and local rates. Each school is under the immediate control of a local board of managers, who have charge of the school property and select the teachers. In the schools wholly under government provision, these boards are appointed by the county council, while in the denominational schools a part of the board is appointed by the council and a part by the denomination under whose control the school was established. In the schools wholly under control of the government, religious instruction is prohibited, but in the denominational schools it is given to those pupils whose parents desire it, but is not compulsory. Attendance between the ages of seven and thirteen years is compulsory.

Evening schools, in which industrial training is given, are provided by the government, but on a basis somewhat different from the elementary schools. The secondary schools are not under national control; they depend for their support upon endowments, subscriptions and rates agreed upon by local authorities. For the organization of English universities, see **UNIVERSITY**.

FRANCE. The system of instruction in France is more highly centralized and completely organized than in almost any other country. Education is divided into three departments, primary, secondary and higher, all of which are under the direct control of the minister of public instruction, who is appointed by the president and is a member of the cabinet. Under him are three general superintendents, one for each of the departments, and in his department each superintendent has nearly supreme authority. The entire country, including Algiers, is divided into seventeen districts, or academies. The head of each of these districts is the academic chief, or rector, who is assisted by a council of university professors. The primary schools in each academy are under the direction of academic inspectors. Each academy is divided into departments, that is, districts for civil administration, and each department is provided with an inspector, who is under the rector of the academy. Primary schools are required in every commune, and in the communes of more than 500 inhabitants separate schools for boys and

girls must be maintained. Each department is required to maintain a normal school for women and another for men. The inspector is the chief authority in his department.

Formerly, secondary education was almost entirely in the hands of the clergy, but the Church schools have been abolished by national legislation, and government control has been extended to secondary instruction, as well as to that of university grade.

GERMANY. In Germany all grades of education are under the control of the government, the minister of public instruction being at the head of the educational system. Three classes of schools are maintained: The primary school, in which attendance between seven and fourteen years is compulsory; the secondary schools, represented by the *gymnasias* and *realschulen*, and the higher institutions, including technical schools and universities. Primary schools are established in all villages and rural communities and are supported by government and local taxation. All teachers are licensed by the government and are required to be graduates of normal schools. Teaching, even in the elementary schools, in Germany is a profession, and one enters upon it with the intention of making it his life work. After serving the required time, the German teacher is retired on a pension. The *gymnasias* are the secondary schools, which give special attention to the ancient classics and fit their students for the classical departments of the universities, while the *realschulen* give attention to modern languages and sciences. Technical schools are numerous and provide for instruction in all lines of skilled labor, as well as in the branches of civil and electrical engineering. For a description of German universities, see **UNIVERSITY**.

OTHER COUNTRIES. The Austrian system is patterned after that of Germany and is almost identical with it. Switzerland has no national system, each canton being independent. The common schools of the canton are supported both by general and local taxation. Italy has a state system extending from the elementary school to the university, and this is organized by ample laws providing for the establishing of common schools in all communities, the qualification and licensing of teachers and compulsory attendance, but these laws receive but little attention and are only partially enforced. For this reason the percentage of illiteracy in Italy is very large. In Spain a similar con-

dition prevails. There are ample laws on the statute books, but they receive little attention from either national or local authorities, and common schools are few and in very poor condition. Sweden and Norway have excellent systems of schools, extending from the common schools to the university, all of which are supported by national and local taxation, and education is compulsory as far as the work of the elementary schools goes. For the system in the United States, see **COMMON SCHOOLS**.

Education Association, NATIONAL, an association organized at Philadelphia in 1857 as the National Teachers' Association, incorporated in 1886 in the District of Columbia under its present title. For the first few years the National Education Association did not gain great strength, but about 1870, through the division of the association into specialized departments and through the absorption of the American Normal Association and the National Superintendents' Association, its effectiveness was greatly increased. There are now seventeen departments, besides an advisory board, known as the National Council. The association holds annual meetings in different parts of the country, at which well-known educators lead in the discussion of all sorts of problems affecting the teacher's calling. The proceedings of the body are published as annual reports. Reports of committees upon special topics are also published under the auspices of the association. The report of the committee of ten upon the course of study in secondary schools, as well as other similar reports, has had great influence in all parts of the country. There are about 10,000 active members in the association and as many more associate members.

Ed'ward, called the *Elder* (?-925), king of England, son of Alfred the Great, whom he succeeded in 901. His reign was marked by successes over the Danes.

Edward, called the *Martyr* (about 963-979), king of England, son of Edgar, whom he succeeded in 975. His stepmother, desirous of obtaining the crown for her son Ethelred, had Edward put to death.

Edward, surnamed the *Confessor* (about 1004-1066), king of England, son of Ethelred II. On the death of his half-brother, Hardicanute the Dane, in 1041, he was called to the throne and thus renewed the Saxon line. He cared little for political matters and spent most of his time in holy works. In 1161 he was canonized.

Edward, THE BLACK PRINCE (1330-1376), the eldest son of Edward III of England. In 1346 he commanded part of the forces at the Battle of Crecy and particularly distinguished himself. In 1355 he commanded the army which invaded France from Gascony and won a victory in the great Battle of Poitiers. By the Peace of Bretigny, several provinces of France were formed into a sovereignty for the prince, under the title of the Principality of Aquitaine. When Limoges had been captured by the French, Edward retook the city (1370) and put to death about three thousand of its inhabitants, and this is the greatest stain on his character. After his return to England he opposed his father in many of his oppressive measures.

Edward I (1272-1307), king of England, son of Henry III, whom he succeeded in 1272. Before his accession to the throne he had been compelled to put down several revolts in Wales, which had been entrusted to his government. He also took part in a crusade with Louis IX of France, but accomplished nothing of importance. After his accession, he again turned his arms against Wales and finally succeeded in annexing that country to England. During the greater part of his reign he was engaged in a struggle for Scotland, and the choice of him as judge between the rival claims of John Baliol and Robert Bruce gave him a hold on the country. With varying fortunes the struggle continued until 1306, when Robert Bruce, a grandson of the rival of Baliol, was crowned at Scone. Edward started north to subdue Bruce, but died on the way.

Edward was a great king and did much for England in the establishment of order in the country and in the restriction of the power of the clergy. For his influence on the laws of his country he is known as "the English Justinian." The most important event of his reign is the placing in the hands of a Parliament, in which the people of England were to be represented, all power to levy taxes.

Edward II (1284-1327), king of England, son of Edward I, on whose death, in 1307, he came to the throne. His weakness and incompetency soon became apparent, and the fact that he was constantly under the dominion of foreign favorites led to numerous revolts. The war which his father had begun against the Scotch, Edward attempted to prosecute, but in 1314 he was completely defeated by Robert Bruce at Bannockburn, and some years later he was com-

pelled to make a most unfavorable treaty with Scotland. He was at length deposed by a conspiracy of his great nobles and his wife, and in 1327 he was murdered.

Edward III (1312-1377), king of England, was made king on the murder of his father in 1327. The real power lay with the queen-mother Isabella and Mortimer, her lover, but three years after his coronation Edward banished Isabella from his court, had Mortimer put to death and took the power into his own hands. In 1333 he conducted an expedition against Scotland and won a victory at Halidon Hill, but in his other campaigns against Scotland he accomplished nothing of importance. French interference in favor of the Scotch gave Edward an excuse for invading France, of which he claimed, through his mother, to be the rightful sovereign. His victories in France were remarkable, and his son, the Black Prince, won particular distinction. These victories, however, and even the capture and imprisonment of the French king, John, had no permanent results, and when Edward withdrew from the war, England was in an exhausted condition. The closing years of his reign were disturbed by constant conflict with Parliament and by the desertion of his son, the Black Prince.

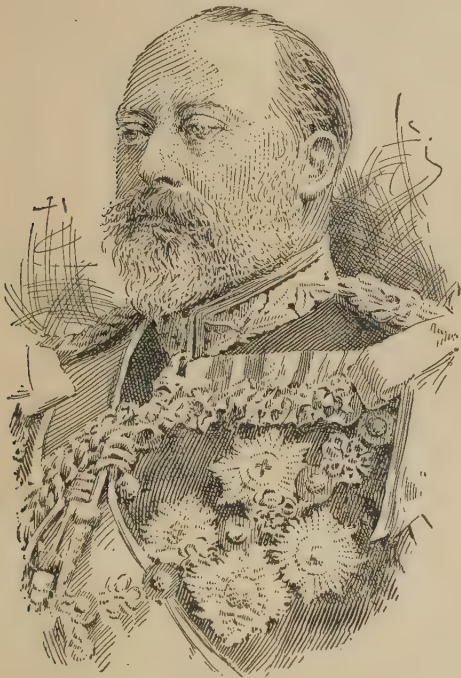
Edward IV (about 1442-1483), king of England. His father, Richard, duke of York, was the grandson of the fourth son of Edward III, while the rival line of Lancaster descended from John of Gaunt, the third son. Edward, on the defeat and death of his father at the Battle of Wakefield, became the head of the Yorkist party, and having entered London, after his splendid victory over the troops of Henry VI and Queen Margaret, was crowned with acclamation. His hold on the throne was not yet secure, however, and when the powerful earl of Warwick, offended at Edward's marriage, went over to the Lancastrians, Edward was forced to leave the country. In 1471 he landed in England with an army, met Warwick and defeated him and was again proclaimed king. The remainder of his reign was peaceful.

Edward V (1470-1483), king of England, son of Edward IV. On his father's death he was crowned king by his uncle, Richard, duke of Gloucester; but Richard denied the legitimacy of the young king and his brother, had them shut up in the Tower and afterward ordered them to be put to death.

Edward VI (1537-1553), king of England, son of Henry VIII by his third wife, Jane Sey-

mour. On his accession to the throne, upon the death of his father, his first care was to strengthen and advance the religious reforms instituted during his father's reign. Edward was himself too young to have much influence in affairs, and the chief power during his reign lay, first with his uncle, Edward Seymour, and later with the earl of Warwick.

Edward VII (1841-1910), king of the United Kingdom of Great Britain and Ireland and emperor of India, the eldest son of Queen Victoria and Prince Albert, born at Buckingham Palace, November 9, 1841. He inherited the title of Prince of Wales and was christened Albert Edward. He was educated at Christ's



EDWARD VII

Church College, Oxford, and Cambridge University. In 1860 he visited Canada and the United States, where he received a most cordial welcome. Two years later, in company with Dean Stanley, the young prince made an extensive journey through Egypt, Palestine and India. In 1863 he married Princess Alexandra, daughter of Christian IX of Denmark, by whom he had six children: Albert Victor, duke of Clarence, who died in 1892; George, duke of Cornwall and York, later George V; Louisa, duchess of Fife; Victoria; Maude and Alexander John, who died in 1871.

Although during the reign of Queen Victoria Edward had little or no part in state politics, he made frequent visits to the leading courts of Europe. He likewise was a close student of the politics of the world, and when he became king he astonished all but those intimately acquainted with him by his tact and sagacity in diplomatic affairs. His reign was characterized by the negotiation of treaties which placed Great Britain in friendly relations with the leading nations of the world. The most notable were the alliances with Japan, France and Italy, and the understanding with Russia. These treaties not only changed the position of Great Britain from that of isolation in which she took pride during Victoria's reign, to that of friendly coöperation with other nations; but they have also exerted a strong influence in maintaining the peace of the world. As a ruler and a diplomat Edward was trusted alike by his subjects and by foreign nations with possibly the exception of Germany, and his influence was such that he became known as the Peacemaker.

Edwy (?-959), king of England, son of Edmund I. He succeeded his uncle Edred in 955. Taking part with the secular clergy against the monks, he incurred the confirmed enmity of the latter. The papal party, headed by Dunstan, was strong enough to excite a rebellion, by which Edwy was driven from the throne, to make way for his brother Edgar.

Eel, a long, slimy, usually scaleless, or almost scaleless, snake-like fish. Eels are sluggish during the day, but become quite active by night, sometimes crawling considerable distances on land through the damp grass. They are good food-fish, though some people are prejudiced against them because of their repulsive appearance. There are a number of species, of which the commonest are the fresh-water eels, living on both sides of the Atlantic, in fresh-water streams for most of the year, but going to the sea to lay and hatch their eggs. See CONGER EEL; ELECTRIC FISH.

Egbert (?-839), considered the first king of all England, was of the royal family of Wessex. He became in 802 king of Wessex, and before 830 he had reduced the other kingdoms and rendered them dependent on him.

Egg, the cell and accompanying products from which develop animals similar to the parent which produced the egg. In the higher animals the period of egg development is long, and often the egg is retained in the body until it is hatched, and the young are partially matured, but in

Egg

more numerous cases the animals lay their eggs to be hatched subsequently. A complete egg consists of four parts, the shell, the white, the yolk and the embryo. The eggs of lower animals and insects are imperfect, but all contain the embryo. The eggs of frogs and fish are deposited in large numbers in the water and are held together by a jelly-like fluid (See SPAWN). Some species of insects lay a large number of eggs and cover them with a fluid resembling varnish, which protects them from the weather and from other enemies.

The eggs of birds are the most perfect and of the most general interest. The shell is composed almost wholly of carbonate of lime and has for its purpose the protection of the parts which it encloses. Just within the shell is a thin, tough membrane, which forms the lining. Next to the lining, and surrounding the yolk, is the white, which is composed almost wholly of albumen. The yolk is also inclosed in a thin membrane and is spherical. It is composed of a variety of substances, some of which contain margarine and oleine; its color is usually yellow. The germinal vesicle, or germ spot, is found within the yolk, and in the eggs of fowls it can be easily distinguished by its pearly-white appearance. It is from this that the young bird or chick is developed by incubation, the yolk and white serving for food during the process. In the large end of the egg there is a space between the lining and shell that is filled with air. As the egg grows old this increases in size. It is supposed by some that the air in this space is used by the chick while it is pecking out of the shell.

The germ is developed by heat, which is supplied by the female's sitting on the nest. The eggs of fowls and most birds require a temperature of 104° F. for successful incubation. The period of incubation varies with the species. The eggs of the white-eyed vireo require only seven days in which to hatch, while those of the common fowl require three weeks, and those of the turkey and most water fowl require four weeks.

The number of eggs laid by different birds also varies with the species. Some birds lay only one during the year, and others, as the hen, lay a large number. The robin usually lays four, the swallow from four to six and the crow four, six or seven. In many instances the color and shape of the egg are closely associated with the habits of nesting. Birds which lay their eggs on the ground without constructing any

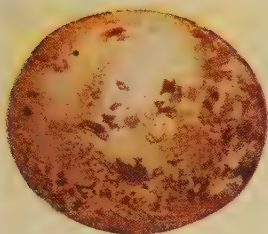
Eggplant

nest, lay an egg which is rounded at one end and nearly comes to a point at the other. If blown by the wind these eggs roll round in a circle, while if they were oval, like those laid in deep nests, they could easily be blown away. (Compare in the *color plate* accompanying the article BIRDS, the eggs of the spotted sandpiper and the tern with those of the sparrowhawk and the crow.) Eggs laid on the ground, or in nests built on the ground, usually take the color of the pebbles or dead grass with which they are surrounded, while the bright colors belong to the eggs laid in well-constructed nests. Another peculiarity of the coloring is that the greatest variation is about the large end of the egg. (See in the *color plate* accompanying the article), the eggs of the wood peewee, bobolink, purple grackle, meadowlark and other birds.)

The economic use of eggs is well known, and the eggs of the hen, the guinea fowl, turkey and domestic duck constitute an important item in the world's supply of food. In Labrador, the Orkney and Shetland islands and some other localities, the inhabitants collect the eggs of sea birds for food.

Eggleston, EDWARD (1837-1902), an American novelist and historian, born at Vevay, Ind. His education consisted of a knowledge of Latin and some Greek and an extensive acquaintance with the French language and literature, all gained largely through his own efforts. When nineteen years old he became a Methodist circuit rider and preached for ten years. His literary career began in 1866, as editor of the *Little Corporal*, at Evanston, Ill. In 1870 he became literary editor of the *Independent*, in New York City, and some time later he gave up that position to become editor of *Hearth and Home*. From 1874 to 1879 he preached in Brooklyn, and from the latter date he devoted himself to literary work. The purpose of his novels was to do "something toward describing life in the back country districts of the Western states," and the scenes of his most popular novels were laid in southern Indiana. Among his novels are *The Hoosier Schoolmaster*, *The End of the World*, *The Circuit Rider*, *Roxy*, *The Hoosier School Boy* and *The Graysons*. He wrote also *A Household History of the United States* and other works on United States history, which are of importance.

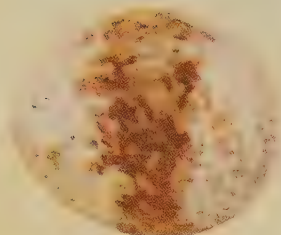
Eggplant, a plant belonging to the same family as the potato, bearing a fruit that in some species resembles a hen's egg. Several varieties of this fruit are cultivated in the United



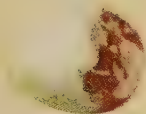
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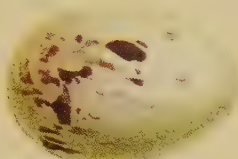
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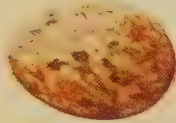
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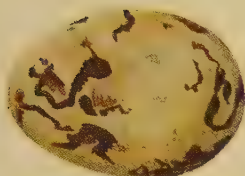
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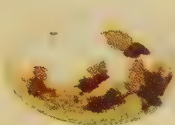
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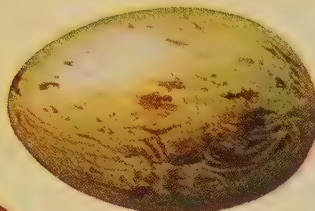
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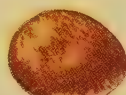
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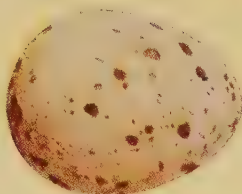
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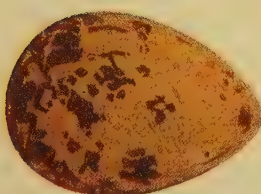
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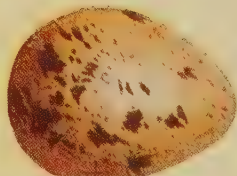
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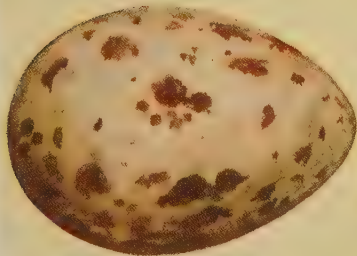
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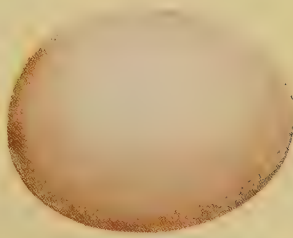
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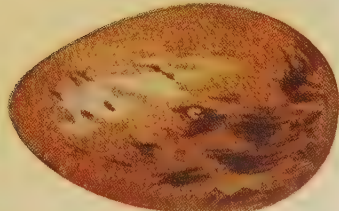
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21

BIRDS' EGGS

Birds of Prey

- 1, Sparrow Hawk. 4, Wood Pewee. 9, Kingbird.
2, Screech Owl. 5, Meadow Lark. 10, American Crow.
3, Sharp-Shinned Hawk. 6, Yellow-Billed Cuckoo. 11, Humming Bird.
8, Purple Grackle. 12, House Wren.

Perchers

Climbers

- 13, Red-Headed Woodpecker.

Scratchers

- 14, Gambel's Partridge. 15, Hen's Egg.

Waders

- 16, Spotted Sandpiper. 17, Green Heron. 18, Semipalmated Sandpiper.

Swimmers

- 19, Gull. 20, Duck. 21, Tern.

States and in other parts of the world, where it is used as a table vegetable. In the United States the purple-fruited species are favorites.

Egmont or **Egmond**, **LAMORAL**, Count (1522-1568), a Flemish statesman and general, born in Hainaut. He succeeded to the family title and estates in 1541 and fought in the campaigns of Charles V in Algeria and against Francis I of France. He was rewarded with high honors and with responsible offices under the emperor. When Margaret of Parma became regent general of the Netherlands, Egmont joined William of Orange in opposing her Catholic policy. When rebellion finally broke out, however, Egmont for a time remained neutral and refused to follow the prince of Orange and other leaders into voluntary exile. Suddenly he was seized by royal officers and imprisoned at Ghent, condemned to death and executed with Count Hoorne in 1568 in the public square at Brussels. Egmont is the hero of one of Goethe's greatest tragedies.

Egoism, a term derived from the Greek and Latin word *ego*, meaning *I*, and used in philosophy in two senses. In its earliest application, egoism meant the theory that nothing except one's own self can really be known; but modern and much more common usage applies it to any system in ethics which sets up the happiness of the individual himself as the justifiable end of his own acts and purposes. In this latter sense it is the opposite of *altruism* (which see). The two theories, however, overlap at many points, and cannot be classed as absolutely distinct systems of philosophy.

E'gret, a name given to those species of wood herons which have the feathers of the

seasons of the year. The egrets are more graceful than the common heron, and the American species is about thirty-seven inches long, has soft plumage, a smooth head and twelve trailing feathers. The egrets have been so much hunted for their white flowing plumes, which women prize for ornament, that they are rapidly being exterminated.

Egypt, *e'jipt*, a country in the northeastern part of Africa, extending from the Mediterranean Sea to the 22nd degree of north latitude and from Syria on the east to Tripoli on the west. The northern boundary is the Mediterranean Sea; the eastern, Syria and the Red Sea; the southern, an arbitrary line drawn from the Red Sea to a point about 200 miles west of Wadi Halfa. From here a northwest line extends to the southeastern point of Tripoli; thence the boundary extends due northward to the Mediterranean. The minor coast waters include the gulfs of Suez and Akabah, between which is the Sinai peninsula. The extent of the country from east to west and from north to south is about equal, being nearly 490 miles, and the area within the boundaries described is 400,000 square miles, or a little more than twice that of Montana, though the government extends over Egyptian Sudan and a vast area to the west, known as the Libyan Desert. Within the area of Egypt proper only about 13,000 square miles are subject to cultivation.

SURFACE AND DRAINAGE. Historically and geographically Egypt is divided into two parts: Lower Egypt, extending from the Mediterranean to Cairo, and including what is known as the Delta Region; and Upper Egypt, extending from Cairo to the southern boundary. The Delta Region is nearly triangular in shape. Its greatest extent from east to west is about 150 miles, and from north to south, 120 miles. This consists entirely of land made by the silt deposited from the river; it is low and level, contains many branches of the river, as well as numerous canals, and is very fertile. Within this region the greater part of the population of the country lives. The habitable portion of Upper Egypt consists of the valley of the Nile, which varies in width from 15 miles, north of Cairo, to about 2 miles, farther up the stream. To the east of the Nile is a hilly and mountainous country, generally known as the Arabian Desert, but it should not be confounded with the desert of the same name in Asia. This region rises gradually by successive elevations until the highest altitudes are found on the borders



EGRET

lower part of the back elongated, reaching to the end of the tail, or even beyond it at certain

of the Red Sea and attain about 7000 feet, though the average altitude is much less than this. The surface is characterized by sand and barren rocks, and nearly all of the region is devoid of vegetation, except in a few places where there is sufficient moisture to afford scanty support for the flocks of the Bedouins. To the west of the Nile is the great Libyan Desert, a sandy plain which is nearly level, but has in a few places depressed areas, whose surface is below the level of the sea. Most of these depressions are watered from subterranean sources or by canals leading to them from the Nile, and they constitute the oases of the desert; some of them are very fertile and all are under the government of Egypt.

MINERAL RESOURCES. The most important minerals are building stone, consisting of granite, porphyry, limestone and sandstone. Of these the granite found near Syene, from which it was named syenite, is the most durable and has been known for the longest time. It was from these quarries that most of the rock for the great pyramids and for many of the ancient temples was obtained. The other stones are also valuable building stones and are now used to a considerable extent. Because of the drifting sands, many deposits of minerals are undoubtedly covered. Engineers who have recently examined the country report that possibly gold mining can be made profitable along the beds of certain dry streams and in other localities, though there has been no attempt at working the deposits.

CLIMATE. Egypt is a land of clear skies and dry atmosphere. On the Mediterranean coast about 8 inches of rain falls during the year, while at Cairo the rainfall never exceeds $1\frac{1}{2}$ inches, but at the extreme south there is a considerable rainfall. Less than one-fifth of the days are cloudy. Lower Egypt has a more even temperature than the desert region, removed from the influence of the sea. At Alexandria the temperature seldom reaches freezing point, but in the hot season, during the period of khamsin, it may reach as high as 110° or 115° . During the fall and winter the prevailing winds are from the north and northwest, while in the spring and summer they are from the south. April and May are characterized by the khamsin, which produces a high temperature and fills the air with sand (See KHAM SIN). The inhabitants divide the year into three seasons: the period extending from November to March; the summer, from March

to June, and the period of inundation, from July to November.

INDUSTRIES. Agriculture is the chief industry of the country and affords employment to more than two-thirds of the people who have a fixed occupation. The most important food plants are the date palm, wheat, rice, millet, vegetables and sugar cane. Besides these, various tropical and semi-tropical fruits are raised. Agriculture depends entirely upon irrigation and can be practiced only where water is obtainable. Because of this, the valley of the Nile is the only habitable portion of the country. The Delta Region is provided with irrigation throughout the year, and here three crops can be grown. Of these, wheat and other cereals are raised between November and March, at the time when water is the most plentiful; cotton and sugar cane mature between March and June, and maize and vegetables during the other months of the year. The soil is exceedingly fertile, and notwithstanding the primitive methods of cultivation, excellent crops are obtained. Since the construction of the barrage across the Nile at Cairo to raise the water in the river, a much larger area of the lower land is subject to irrigation, while the construction of the great dam at Assuan regulates the supply of water for the year (See ASSUAN; IRRIGATION). Most of the land is rented by those who work it.

Manufactures are comparatively unimportant, and the only manufactured article having any considerable export is cigars. Tobacco might be raised in the country, but since 1890 its production has been prohibited by the government, because the quality grown is inferior to that imported from Turkey, and its use would curtail the demand for Egyptian-made cigars. In Lower Egypt there are a few sugar refineries and a number of cotton mills.

TRANSPORTATION. The Nile is navigable for small steamers as far as the first cataract, which is just north of the southern boundary. The country contains 1400 miles of railway, which is owned and operated by the government, and about 800 miles of so-called agricultural roads, operated by private corporations. These roads connect the agricultural regions with the main lines of railway and provide transportation for the produce of the country. The northern division of the Cape-to-Cairo railroad has been constructed as far as Khartum, about 1200 miles south of Cairo. Telegraph communication between the principal cities and with other countries is complete and a fairly good postal

system is maintained. The commerce of the country is comparatively small and is confined to the necessities of the population. The imports consist of manufactured goods, particularly textiles, some food products and machinery, while the exports consist of cigars, cotton and sugar. Egyptian cotton is of the long staple variety (See COTTON) and finds a ready market at high prices in England and other cotton manufacturing countries.

INHABITANTS. The great bulk of the population consists of Egyptians; the lower class are styled *jellahs* and constitute by far the majority of the people. In the towns are found many Arabians, Bedouins and Copts, while the foreign element includes Greeks, Italians, English, French, Russians, Germans and some nationalities from Asia. In the rural districts and smaller towns the inhabitants are almost wholly Egyptian, while in Alexandria and Cairo the foreign element is in the ascendancy.

GOVERNMENT AND RELIGION. The government is an hereditary monarchy, and the ruler is styled the khedive. Theoretically the powers of the ruler are absolute, but practically they are much curtailed. He is assisted by a council of state, composed of six ministers, who have charge, respectively, of the departments of interior, finance, justice, war, public works and public instruction, and foreign affairs. Theoretically, Egypt is tributary to Turkey, and the government pays the sultan a fixed sum, but practically Egypt is a British dependency. Because of French and British financial interests in the country, the governments of these two countries jointly assumed control of the finances of the Egyptian government in 1879, but in 1883 the control passed to Great Britain, which placed a financial agent in Egypt, and the powers of this agent have been gradually extended until now he is practically at the head of the government.

In religion nearly all of the people are Mohammedans. A few of the Copts belong to the Abyssinian Church, and in the large towns are found adherents of the Roman Catholic and other forms of Christian faith, but these are nearly all among the foreigners.

CITIES. The important cities are Cairo, the capital; Alexandria, the principal seaport; Rosetta and Damietta, at the mouths of the Nile, and Suez and Port Said, at either end of the Suez Canal. See ALEXANDRIA; CAIRO; SUEZ CANAL.

HISTORY. The Egyptians are the earliest people known to us as a nation. By the beginning of the fifth century B. C., they were living under a settled government; they had built cities, invented hieroglyphic signs and improved them almost into an alphabet. The arrangement of the Egyptian chronology is still a much disputed point among scholars. A list of the kings, arranged in thirty dynasties, was made by the priest Manetho in the third century B. C., and this division is still used. The fourth dynasty, distinguished as the "Pyramid Dynasty," was the most important in early Egyptian history. It was at its height about 2700 or 2800 B. C. and left as its monuments the greatest of the pyramids (See PYRAMIDS). The twelfth dynasty, which seems to have begun about 2000 B. C., exercised a just and able rule over a prosperous country. Literature especially flourished during this period. About 1700 B. C., Egypt was conquered by a people whose rulers were called the Hyksos, or Shepherd Kings. Nothing is known of these people, except that they had first conquered western Arabia and Syria. The Theban princes seem to have preserved a state of semi-independence under the Hyksos rulers, and at last a revolt arose which ended by the Shepherd kings being driven out of Egypt by the Theban princes about 1600 B. C. With the expulsion of the Shepherd kings began the reigns of those great Theban kings who built the magnificent temples and palaces at Thebes.

The nineteenth dynasty began with Rameses I. Seti I, the successor of this Rameses, began a war against the Hittites, which was continued under his successor and grandson, the great Rameses II, or Sesostris. Until recently it was believed that Rameses II was the Pharaoh who had oppressed the Hebrews, and that the Exodus occurred under his successor, Menephtah. Under the later kings of the nineteenth dynasty, the Egyptian empire began to decay. The twentieth dynasty began with Rameses III, a strong king, who was followed by a succession of weak rulers, dependent for the most part on their priests. A priest dynasty, the twenty-first, came to the throne with Herhor. He attempted to restore Egyptian rule in the East and conquered Jerusalem. After his death Egypt was torn by civil war, and eventually the Ethiopians conquered it. In 525 B. C. Cambyses, king of Persia, overran Egypt and made it a Persian province. After the Persian defeat at Marathon, the Egyptians arose and

recovered their independence for a short time, but were again subdued; and in spite of two other revolts, Egypt remained a Persian province until Persia itself was conquered by Alexander the Great in 332 B. C.

Egypt now became a Greek state, and the Egyptians were treated as an inferior race. Alexandria was founded as the new Greek capital. On Alexander's death, his general, Ptolemy, took possession of the throne and became the first of a Greek dynasty that for three hundred years made Egypt one of the chief kingdoms of the world. The Ptolemies were patrons of letters and art, and Theocritus, Callimachus and Euclid flourished under their rule. But while the Alexandrian Greeks managed to keep down the native Egyptians, they were themselves coming under Roman influence. The later Ptolemies were obliged to ask the help of Rome in internal and external troubles, and Cleopatra maintained her power only through her personal influence with Julius Caesar and Mark Antony. On the defeat of Antony by Augustus in 30 B. C., Egypt became a province of Rome. It was still a Greek state, however, and Alexandria was the chief seat of Greek learning and science. Gradually the old Greek and Egyptian religions gave place to Christianity, and this is perhaps the most important event in Egypt during the Roman rule.

On the division of the Roman Empire, in the time of Theodosius, into the Western and Eastern empires, Egypt became a province of the latter and sank deeper and deeper into barbarism and weakness. It was conquered in 640 A. D. by the Saracens, under Caliph Omar. Of the Saracen rulers who made Cairo practically the center of Mohammedan influence, the greatest was Saladin. The last Saracen dynasty was overthrown by the Mamelukes in 1250, and the Mamelukes in their turn were conquered by the Turks in 1517. They made repeated attempts to cast off the Turkish yoke, and they had virtually done so by the end of the eighteenth century, when Napoleon conquered Egypt. The French held it till 1801, when they were driven out by the Turks, with the aid of the British.

On the expulsion of the French, a Turkish force took possession of the country, and Mehemet Ali was made pasha. He was a man of great ability, administered the country vigorously and greatly extended the Egyptian territories. At length he rebelled against the porte, and, after gaining a decisive victory

over the Ottoman troops in Syria, was acknowledged by the sultan as viceroy of Egypt, with the right of succession in his family. Mehemet Ali died in 1849 and was succeeded by his grandson Abbas Pasha, who in his turn was succeeded by his uncle Said Pasha, the son of Mehemet. Under the rule of Said Pasha railways were opened and the cutting of the Suez Canal was begun. After Said's death, Ismail Pasha, a grandson of Mehemet Ali, obtained the government (1863). His administration was vigorous, but exceedingly extravagant, and brought the finances of the country into great disorder. In 1866 he received permission from the sultan to adopt the title of khedive. In 1879 he was forced to abdicate under pressure of the British and French governments and was replaced by his son, Tewfik. The so-called national party revolted in 1882 and forced the khedive to flee, but on July 11 a British fleet bombarded Alexandria and restored him. From this time on, although the khedive remained the nominal head of the government, Egypt became practically the protectorate of Great Britain.

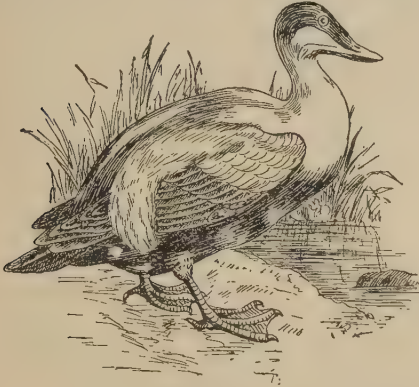
A rebellion in the Sudan, under the leadership of the Mahdi, now gave the government trouble. (See Mahdi.) Troops were sent under General Gordon to protect the British interests, but the Mahdi's forces were strong enough to shut General Gordon up in Khartum. For nearly a year he held the town, but he was killed (January 18, 1885) before the relief expedition under Wolsely could reach him. When the expedition withdrew, the Sudan was left in a state of anarchy. In 1896 the Mahdi again threatened Egypt, and the British government again took steps to suppress him. Sir Herbert Kitchener was made commander in chief of the Egyptian army, and in 1898 he won a final victory, which once more brought the Sudan under the rule of the governments. In 1892 Tewfik was succeeded by his son, Abbas Hilmi, an able ruler. Population in 1897, 9,734,405; in 1907, 11,189,978.

Egyptian Architecture. See ARCHITECTURE.

Ehrenbreitstein, *a'ren brite'stine*, a Prussian fortress of great strength, situated opposite the confluence of the Moselle with the Rhine on a precipitous rock 400 feet above the river, inaccessible on three sides. The fortifications, which were erected in 1816-1826, at a cost of \$6,000,000, accommodate a garrison of 14,000 men and possess room for stores to last an army of 60,000 for a year. Population in 1910, 6,000.

Eider Duck

Eider, i'der, Duck a species of duck found both in America and Europe. Its favorite haunts are solitary rocky shores and islands. The eider duck is about twice the size of the common duck. The male is mostly black, but has a white back and head, with a black crown. The female is reddish drab, spotted with black, and has two white bands on the wings. The nests are usually formed of drift grass and dry seaweed and are lined with a large quantity of down, which the female plucks from her own breast. One female generally furnishes



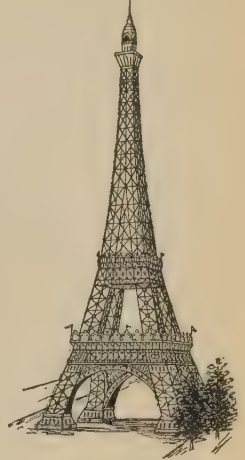
EIDER DUCK

about a half-pound of down. This down, from its superior warmth, lightness and elasticity, is in great demand for beds and coverlets; and the districts in Norway and Iceland where these birds abound are guarded with the greatest vigilance as a most valuable property. As found in commerce, this down is in balls of the size of a man's fist. It is so fine and elastic that five pounds of the best quality are sufficient for a whole bed.

Eiffel, i'fel, GUSTAVE (1832-), a celebrated engineer, born at Dijon, France. He first attracted attention by the construction of a bridge, in which was employed for the first time the compressed air method of sinking foundation cylinders. This was followed by many other works of great engineering skill. The most important among these, and the one which has made his name famous throughout the civilized world, is the Eiffel Tower of the Paris Exposition of 1889. Mr. Eiffel was made an officer of the Legion of Honor in recognition of his genius. In 1893 he was connected with the Panama scandal, and was convicted of misappropriating funds of the canal company. For this he was sentenced to fine and imprisonment.

Ekaterinburg

Eiffel Tower, a remarkable tower erected in the Champs de Mars in Paris and named from its projector, Gustave Eiffel. The tower was completed in 1889 and was designed as the leading architectural feature of the Paris Exposition of the following year. Its base is 330 feet square, and the support is four iron columns which rest upon massive masonry. The height is 984 feet, and there are platforms at 189 feet, 380 feet and 906 feet, which can be reached by elevators and by stairs. The first platform contains restaurants, and the third is partially devoted to an experiment station of the weather bureau of France. The tower contains 7300 tons of iron and steel and cost over \$1,000,000.



EIFFEL TOWER

Eight-hour Day. The trade unions in England and America have long demanded the passage of laws limiting the hours of labor in a single day to eight. This proposal was first made as early as 1833 and has since been vigorously supported. In England the agitation has failed to accomplish any important results, but in the United States all government work is carried on on this basis, and eight-hour days are in force to a greater or less extent in at least a dozen states. On the continent of Europe the eight-hour day has been one of the ideals of the socialists, but, except in Germany, the movement has made little headway. In Australia, however, for many years, laws limiting the day's work to eight hours have been in force. See LABOR ORGANIZATIONS.

Eisleben, ise'la ben, a town of Prussian Saxony, 18 mi. w. of Halle, celebrated as the place where Luther was born and where he died. There are many memorials of Luther and also a bronze statue of the reformer, erected in 1883. Copper is extensively worked in the neighborhood. Population in 1910, 28,900.

Ekaterinburg, ya kah'ta ren boorg', or **Ye-katerinburg**, a fortified town of Russia, in the Province of Perm, on both banks of the Isset, 180 mi. s. e. of Perm. It is the center of the mining district of the Ural region; and

gem-cutting, making of machinery, cloth and candles are industries. Population, 55,500.

E'lam, the ancient name of a country or region in Asia, east of the Lower Tigris. A king of Elam is said in the cuneiform inscriptions to have conquered Babylonia and Assyria about 2300 B. C. The country was later incorporated in the Persian Empire.

E'land, the largest of all the antelopes, about the size of an ox. Its flesh, especially that of the thighs, is highly prized, when dried. Consequently, the animal is nearly exterminated



ELAND

in the neighborhood of Cape Colony, where it was once common. The color is a light or grayish brown. The eland possesses a short mane and fine spreading horns, that are about eighteen inches long and nearly straight. See ANTELOPE.

Elasticity, *e'las tis'i ty*, the property of matter by virtue of which a body is enabled to resume its original form when the outside force by which that form has been changed is removed. Nearly all substances are elastic, but some are much more so than others. Gases are the most elastic, and liquids the least. Hard solids, such as iron, steel and marble, are more elastic than soft ones like dough, putty and lead. Whenever a substance is compressed or extended beyond the limit of its elasticity, it will not resume its former shape. This is often illustrated by rubber bands that have for some time been stretched to a high degree of tension. Such bands lose their elasticity. By compressing gases with a sufficient force, most of them can be changed into liquids. In some instances these liquids return to the gaseous form as soon as the pressure is removed, while in others they

do not. The elasticity of torsion, or twisting, illustrated by twisting a cord or wire, is considered the most delicate measure of force and is employed in the most sensitive scientific instruments, such as the galvanometer.

El'ater. See CLICK BEETLE.

El'ba, a small island in the Mediterranean, in the province of Leghorn, Italy, separated from the mainland by the Strait of Piombino, about 6 miles wide. This island is 18 miles long and from 3 to 10 miles broad and is traversed by mountains, which rise to a height of over 3000 feet. It is rich in iron, marble, granite and salt, and iron ore is exported. Excellent wine and fruits are produced. It has two seaports, Porto Ferrajo, the capital, and Porto Longone. The Treaty of Paris in 1814 erected Elba into a sovereignty for Napoleon, who resided in it from May 4, 1814, to February 26, 1815.

El'be, a river of Germany, one of the largest in Europe. It rises on the slopes of the Schneekoppe, one of the highest summits of the Riesengebirge, between Bohemia and Silesia. The length, including windings, is about 780 miles. Its chief affluents are the Moldau, Eger, Saale, Mulde and Havel. It is navigable from its confluence with the Moldau in Bohemia; its estuary at Cuxhaven is much encumbered with sand banks. The chief cities on its banks are Dresden, Torgau, Wittenberg, Magdeburg and Hamburg.

El'berfeld, a town of Rhenish Prussia, 15 mi. e. of Düsseldorf. Its prosperity, which is of recent date, is largely due to the cotton manufacture. Linen, woolen, silk and mixed silk goods, ribbons and velvet are extensively made and exported. There are numerous mills for spinning cotton twist, linen yarn and worsted, besides numerous dyeworks and miscellaneous industrial establishments. The commerce is extensive, and Elberfeld is an important railway center. Population in 1910, 170,118.

El'bing, an important commercial seaport town of West Prussia, on the Elbing, near its entrance into the Frisches Haff. It was once a flourishing Hanse town, and it still has an extensive industry and trade, the manufactures including iron goods, machinery, brass and tinplate goods. It has also ship-building yards. Population in 1910, 58,631.

Elburz, *el boorz'*, a lofty mountain range, extending over northern Persia, parallel with, and overlooking, the Caspian. The highest peak is Mount Demavend, 18,500 feet; the average height of the range is 6000 to 8000 feet.

El Caney, *el kah'na e*, BATTLE OF, a battle of the Spanish-American War, fought July 1, 1898, between 4500 Americans, under General Lawton, and about 500 Spaniards, well-entrenched, under General Vara de Rey. The battle was one of the few important land contests of the war, was fought desperately and caused a loss of more than 400 men on each side. The Americans won the day.

El'der, a name given to several species of small trees or shrubs, which have opposite, pinnated leaves and bear small white flowers in large, conspicuous, flat-topped clusters. The berries are black or red in color and somewhat bitterish in taste, though they are sometimes used in making pies and a kind of wine. Some varieties are cultivated because of their beautiful foliage and handsome shape. The branches are woody on the outside, but the whole center is filled with a white pith. The wood of the European species is tough and hard and takes a good polish.

El'don, LORD (John Scott) (1751-1838), a lord high chancellor of England, one of the most famous of English jurists, born at Newcastle-on-Tyne, June 4, 1751. He was educated at Oxford, where he gained high honors. He was admitted to the bar in 1776 and soon rose in his profession, becoming member of Parliament in 1783. There he gained influence by his intellectual and moral force and was knighted in 1788 and made solicitor-general. Eleven years later he became chief justice of the court of common pleas and was made a peer, with the title of Baron of Eldon. In 1801 he was appointed lord chancellor of England, an office which he held until 1827, with one brief intermission. During that period he possessed immense influence with the ministry and monarchs. He resigned in 1827 and retired to private life. He is recognized as one of the greatest of common law judges.

El Dorado, *el do rah'do*, a term applied first to a king of South America who was said to have covered his body annually with gold dust and to have bathed in a sacred lake. The term was then applied to a fabled gold city, and then to a country reputed to have been immeasurably rich. The Spaniards spent large sums of money in exploring expeditions to discover the city and country. The most noted of these were those of Diego de Ordaz in 1531, whose lieutenant, Martinez, claimed he had been in the golden city, called Omoa, and of Orellana, ten years later. The name is now used to designate any place of fabulous wealth.

El'ecampane', a plant of the natural order Compositae, found in the United States, Europe and Asia. It is three or four feet high and has root leaves often two feet or more in length. The flowers are large and yellow, and the root, which is perennial, possesses a bitter, camphor-like taste.

Election, in politics, the selection by voting of a person or persons to occupy some post or office. The most important elections are those of the members of the legislative assemblies of the different countries, and these are regulated by strict laws. In such elections voting by ballot is now general (See BALLOT). Federal jurisdiction of elections in the United States extends to the elections of such officers of the Federal government as are elective, namely, the president, vice-president and members of the House of Representatives. The election of officers of the state and local governments is regulated by the several states. The president and vice-president are elected by a college of electors (See ELECTORAL COLLEGE). Each state is entitled to two senators in Congress, who are elected by the legislatures of the several states; members of the House of Representatives are elected directly by the people. All citizens of the United States are entitled to vote except citizens of the District of Columbia. The constitutions of the several states grant to certain citizens the right of suffrage. The laws of each state prescribe the qualifications of voters, which vary somewhat in the different states. The following qualifications may be classed as universal: That the elector shall be over twenty-one years of age, neither lunatic nor pauper, and prepared to take, if necessary, an oath of allegiance to the Federal government. The length of residence required for voting in the state varies in the different states. Property qualification is required only in Rhode Island. Some of the states require an ability to read and write. Wyoming, Colorado, Utah, Idaho, California, Oregon, Arizona and Kansas extend the suffrage, with the right to hold office, to women. In Illinois women may vote for president and local officers such as mayors, but not for senators, representatives or state officers. See WOMAN SUFFRAGE.

Elective Studies, a term that has come into common use in recent years to indicate courses of study in American schools and colleges which may be chosen, or elected, by undergraduate students. The development toward election has been slow, and there have been notable reactionary movements, but few institu-

tions now adhere absolutely to one unchangeable curriculum. The advantage of the elective system is the freedom which it gives students to develop along the lines of their special strength or inclination. The danger lies in abuse of this freedom—the election of courses that are easy but have little disciplinary or instructional value. To obviate this disadvantage, several methods have been used, such as the division of the courses into groups, each student being required to choose a certain amount of work from each of these groups, and the assignment of members of the faculty as advisers to the students. Practically all of the state universities now have the elective system, and most of the new privately endowed institutions, as well as some of the older ones, are rapidly extending their elective courses.

Elect'oral College, in the United States, a body of men who are chosen by the people of the several states to elect the president and vice-president. The number of electors chosen by each state is equal to the whole number of members that the state sends to both houses of Congress. No senator or representative or person holding an office of profit or trust under the United States can be chosen as an elector. The day on which electors are chosen must be the same in all states—the Tuesday next after the first Monday in November. The electors meet in their respective states on the second Monday in January and vote by ballot for president and vice-president. They then make distinct lists of all persons voted for as president and vice-president, and of the number of votes for each; these lists they sign, certify and transmit, sealed, to Washington, directed to the president of the Senate, who opens them in the presence of both houses of Congress, on the second Wednesday of the succeeding February. A majority of the whole number of electoral votes is necessary to elect. If no candidate has a majority of votes, the House of Representatives must choose one of the three persons having the highest number of votes. The electors no longer use discretionary powers, as planned by the Constitution makers, but cast their votes for the candidates previously nominated by their respective parties.

Electoral Commis'sion, a commission appointed by an act of Congress, January 28, 1877, to investigate the returns of electoral votes from Florida, Louisiana, Oregon and South Carolina and to determine the presidential election of 1876. The commission numbered fifteen mem-

bers, consisting of three Republican senators, two Democratic senators, three Democratic representatives, two Republican representatives and five associate justices of the Supreme Court. It was soon apparent that the commission was evenly divided between the two parties, with the exception of the fifth justice, Bradley, who had taken the place of Justice Davis of Illinois. However, he cast his vote with the Republican members and decided against the Democratic claim that the commission should go behind the returns and investigate charges of fraudulent voting and manipulation of returns. This point being determined, the commission in every case sustained the validity of the Hayes electors, thus deciding the election in favor of Mr. Hayes and against Mr. Tilden. See UNITED STATES OF AMERICA, subhead *History*; HAYES, RUTHERFORD BURCHARD; TILDEN, SAMUEL JONES.

Electors, GERMAN IMPERIAL, those German princes who had a voice in the election of the German emperor (See GOLDEN BULL). Originally the number was seven, but in 1648 it was increased to eight and in 1692 to nine.

Elec'trical Fishes, a name given to fishes that give an electric shock when touched with the hand or any electric conductor. One of the best known is the electric eel, a native of South



ELECTRIC EEL

America. It is of nearly equal thickness throughout and grows to the length of six feet. A species of catfish about four feet long that lives in the Nile, and several species of torpedoes, one of which is sometimes found on the eastern coast of the United States, are electric. The



ELECTRIC CATFISH

seat of the four organs that give the shock is along the under side of the tail. After a few discharges, the current is weakened, and an interval of rest is required for a new storage of force.

Elec'tric Bat'tery, also called *galvanic battery* and *voltaic battery*, a device for generating electricity by chemical action (See ELECTRICITY,

subhead *Voltaic*). The simplest form of an electric battery consists of a tumbler or cup, partially filled with water, to which about a tablespoonful of sulphuric acid has been added, and in which a strip of zinc and a strip of copper have been so placed that they do not touch each other beneath the surface of the liquid. When the strips of metal are joined at their upper ends, either by placing them together or by connecting them with wire, chemical action occurs between the water and the zinc, and electricity is generated. The wires are called *poles* or *electrodes*, the one attached to the copper being the positive (+) and that attached to the zinc, the negative (—) electrode. See **ELECTRICITY**, subhead *Positive and Negative*.

There are various patterns of electric batteries, but in all, the cups or cells are the units for small batteries, and tanks are the units for large batteries. The principle upon which the battery acts is that of having two substances, of different electrical potentiality, immersed in the liquid, upon one of which it acts. One of the most common patterns is the cell used for ringing door bells and operating telephones. This consists of a glass cup, containing a solution of sal ammoniac in water, into which is placed a strip of zinc and a plate of carbon. What is known as a *dry* battery is made on a similar plan, but the liquid is mixed with starch and glue into a paste, so that it will not spill if the cup is overturned. See **BUNSEN'S BATTERY**; **DANIELL BATTERY**.

Electric Clock, a clock driven or controlled by electricity. The common method of regulating clocks by electricity is to attach to each a device, consisting of an electro-magnet attached to a clockwork, which will cause the clock to be wound at frequent intervals, so that the motive power by which it is run will not vary. Some electric clocks are so connected with a central timepiece that the hands are adjusted at frequent intervals to agree with those of the regulating clock; but the most successful plan is to have all the clocks in the system operated from the regulating clock. In such a system there is but one complete clock, and all of the others are simply dials, with such wheelwork attached as is necessary to give the proper motion to the hour and minute hands. See **CLOCK**.

Electric Dy'namo. See **DYNAMO**.

Electric Generator, a form of dynamo-electric machine, used for the production of a powerful electric current. The generator differs

from the ordinary dynamo in being built on to the engine or water wheel which furnishes the power. If an engine is used, a fly wheel with a heavy rim is attached to the machine to insure uniform speed. See **DYNAMO**.

Electric Heating. When an electric current is made to pass through a conductor that offers great resistance, the temperature of the conductor is raised. Electricians have taken advantage of this fact to use electricity for heating, cooking and welding. The wire is imbedded in an enamel which has about the expansive degree of the conductor. The current, meeting resistance, heats the wire. If there were no substance present to convey off this heat the wire would fuse or weld, but the enamel carries off the heat generated, and the current continues to pass along the wire. In practice, the enamel plates, with the wire buried in them, are placed in ovens, on the bottoms of kettles, pans and other kitchen utensils, in broilers, gridirons and on the polishing surface of flatirons. By this means frying, boiling, baking, broiling and stewing are performed by the heat produced by electricity. Welding iron and steel and other metals, susceptible of being united under high temperatures and pressure, is done by pressing together the surfaces to be welded and then passing through them a current of low voltage. In practice, the parts to be welded are clamped together, and more pressure is applied when the metal, at the point of weld, is brought to a welding heat. One particular advantage found in welding by electricity is that the surfaces do not oxidize; consequently, there is no necessity for using a flux.

Electricity, *é'lec tris'i ty*, a form of energy. If a warm lamp chimney is rubbed with a piece of silk, or if a stick of sealing wax is rubbed with flannel, it will attract light bodies, such as bits of paper, small pieces of excelsior and sawdust. Numerous other substances, such as hard rubber, resin and gutta-percha, show the same peculiarity. This characteristic of certain substances was discovered in amber, a substance which the Greeks called *electron*, by Thales, a Greek philosopher who lived six hundred years B. C. From this instance, we obtain the word *electricity*.

WHAT ELECTRICITY IS. For centuries electricity was considered a peculiar property, possessed by few substances. It was interesting only on account of the strange effects which it produced, and it is only since about 1840 that it has been turned to practical use. Many theo-

ries concerning electricity have been advocated, only to be abandoned as a fuller knowledge of the subject showed their inability to explain its effects. While scientists do not claim to understand fully what electricity is, they probably know as much about what it is as they do about what heat and light are, and they are now generally agreed that electricity is a form of molecular motion (See MOLECULE; WAVES). This motion is supposed to be different from the motions which produce heat and light, just as its effects are different, but the effects of all these motions are carried in much the same way.

HOW ELECTRICITY IS PRODUCED. The experiments with the lamp chimney and the sealing wax, to which attention was directed, show that one way of producing electricity is by friction. There is also another way—by chemical action. On account of these two general sources from which electricity is derived, it was formerly classified under two heads, *static*, or *frictional*, electricity, and *galvanic*, or *voltaiic*, electricity. Notwithstanding the fact that a more complete knowledge of the subject has shown that there is no good reason for this division, it is still followed.

FRICTIONAL OR STATIC ELECTRICITY. This is the name applied to all electricity produced by friction. When glass, rubber, sealing wax and other substances are rubbed, they become electrified, or charged, and will attract light bodies, such as bits of paper and sawdust. Many similar experiments prove that electrified bodies possess the power of attracting certain other bodies. The electric force accumulates at the ends of the bodies, which for this reason are called poles; therefore, electrified bodies, except spheres, show polarity.

Positive and Negative Electricity. If we present the sealing wax to the glass tube, the two objects will attract each other, but two electrified glass tubes or two electrified sticks of sealing wax will repel each other. A pith ball, suspended from a silk thread so that it will be between a glass tube and a stick of sealing wax, both of which are electrified, will vibrate rapidly between them. If we should present the tube and the sealing wax to bits of paper, we should find that these would fly first to one and then to the other. Numerous experiments show that these bodies are differently electrified, and that bodies similarly electrified repel each other, while those oppositely electrified attract each other. The terms positive (+) and negative (—) are used to indicate these

different conditions. The glass when rubbed with silk is positively electrified, while the sealing wax when rubbed with flannel is negatively electrified.

How Electricity Travels. Electricity travels through some substances easily, while there are others through which it will not pass at all. Substances of the first class are called *conductors*. All metals, most liquids, animal tissues and the earth are good conductors, silver and copper being the best. Substances of the second class are called *nonconductors*, or *insulators*. Glass, resin, rubber, dry wood, dry air, silk and woolen are illustrations of good insulators. No sharp line can be drawn between conductors and insulators, as there are numerous substances, such as damp air or unbaked wood, through which some electricity will pass. These substances are both poor conductors and poor insulators. Electricity passes through a conductor from molecule to molecule, the same as heat passes from one end of an iron rod to the other.

A body which is a good conductor cannot become electrified unless it is placed upon an insulator, as the electricity passes off as fast as formed. One cannot electrify a brass rod while holding it in the hand, but by suspending it by a silk cord or laying it on a tumbler, so as to insulate it, and rubbing it with silk, it may be electrified.

The electrical condition of a body is called its electrical *potential*, which means the same as electrical pressure. The more highly electrified a body is, the higher its pressure, or potential. When two bodies of unequal potential are connected by a conductor, their potential is equalized by a flow of electricity from the body having the higher to that having the lower. As static electricity tends to escape into the air, the conductor serves a useful purpose by preventing it from so doing, the same as a pipe carrying water keeps the liquid from spreading over the surface along which it flows. This flow of electricity is called a current, but it is a current of force, merely. Positive currents of electricity flow from bodies having a high potential to those having a low potential, while negative currents flow from bodies having a low, to those having a higher, potential.

Induction. Bodies become electrified in two ways; by direct contact with the electrifying agent, as in the case of friction, and by being brought into the presence of an electrified body. The second method is known as *induction*. It

is found that all electrified bodies influence the atmosphere surrounding them. If an electrified glass tube be brought near an electroscope, the arms immediately separate; when the tube is withdrawn, the electroscope returns to its former position, showing that it did not receive any charge from the electrified body. A body can be charged by induction, however, by removing the opposite electrification. This is due to the fact that when an electrified body is brought near an object, it induces the opposite kind of electrification on the side next to it and the same kind on the opposite side. The principle of induction is used for charging nearly all electrified bodies, either for laboratory or practical purposes.

Electricity on the Surface. In every electrified body, the electric force gathers on the surface only; consequently a hollow body will contain as much as a solid body of the same size. An eggshell covered with tin foil can be as strongly electrified as a solid piece of copper of the same shape and size. Bend a piece of tin or sheet-brass so as to form a cylinder at least three inches in diameter; then attach an electroscope by a wire to the outer surface, suspend another from the inner surface, and place the cylinder on a glass support, like a tumbler. Electrify the outer surface, and the balls of the first electroscope will separate, but those of the second will not be affected. If you electrify the inner surface, the effect will be shown by the electroscope suspended from that surface, while the one attached to the wire will not be affected.

Electric Discharge. Whenever the non-conductor between two oppositely electrified bodies breaks down and the current passes through the intervening space, it is called a discharge. The nature of the discharge depends largely upon the shape of the conductor and the nature of the insulating medium. When the conductors present a rounded surface, like two balls, and an insulating medium, such as the open air, offers a good degree of resistance, the discharge is in the form of a spark, which takes a zigzag course, because it follows the line of least resistance. If, instead of two balls, two oppositely electrified points are held near each other, the discharge flows steadily, and in a dark room and with a strong current it appears as a brush of purple light. If the resistance of the air is removed by enclosing these points in a vacuum, the effect is much stronger. Certain toys used with electrical machines are constructed in fantastic designs, and these, when placed in vacuum

tubes, are illuminated by the discharge of the current from the machine. Lightning is an effect produced by a discharge through the lower layers of the atmosphere, and it corresponds to the first effect described; the aurora borealis is caused by a discharge through the upper regions of the atmosphere and corresponds to the second effect. A practical use of this discharge is seen in the arc light (See ELECTRIC LIGHT).

VOLTAIC ELECTRICITY is electricity generated by chemical action. It was so named from Volta, who constructed the first apparatus for its production (See ELECTRIC BATTERY). On account of the constant current maintained by the chemical action in the battery, voltaic electricity is sometimes called *current electricity*. Voltaic electricity is very convenient for many purposes for which static electricity is not suited, on account of the expense of maintaining a constant current by the use of a dynamo electric machine. Some of the most common uses are in ringing doorbells and in operating electric signals, the telegraph and telephone.

The effects of voltaic and static electricity are practically the same, and the great advance made in the application of electricity to the arts has been because of the discovery that static electricity can be used for many purposes for which only voltaic electricity was formerly supposed possible. The effects of electricity may be classed as mechanical action, heat, light and chemical action. For a description of the applications necessary to produce these effects, see DYNAMO; ELECTRIC MACHINE; ELECTRIC LIGHT; ELECTRIC MOTOR; ELECTRIC RAILWAY; ELECTROLYSIS, ROENTGEN RAYS; for the relation of electricity to magnetism, see MAGNETISM; for electrical measurements, see ELECTRIC METER; GALVANOMETER.

Electricity, USES OF, IN MEDICINE. When an interrupted electric current passes through the human system, it produces a contraction of the muscles in the parts affected every time the circuit is broken or closed. By the use of an electric machine or a battery with an induction coil, such a current can be used successfully in treating such diseases as paralysis of the muscles, gout and rheumatism. Surgeons also employ electricity for cauterizing wounds and removing diseased tissue. For these purposes the electrodes are joined by fine wire, which are raised to white heat by the passage of the current. Very delicate instruments of this nature are constructed, and they are specially valuable for

Electric Light

treating diseases of the nose and throat. In most cases the current employed is generated by static machines.

Electric Light, light obtained through heating a suitable substance, as carbon, to incandescence, by causing an electric current to pass through it. The principle of the electric light was discovered by Sir Humphry Davy in 1800. He found that when two pieces of charcoal, which are connected with opposite poles of a powerful electric battery, were pressed together, a flame appeared between them. This was the origin of the electric arc light, but the expense of the material consumed in the batteries made a practical application of this method of lighting at that time impossible. An electric light, however, was introduced into the lighthouse of Dungeness, on the southern coast of England, in 1862, and it continued in use for a number of years; but it was not until the invention of the dynamo in 1870 that the electric light became possible for commercial purposes. There are now three systems of lighting in general use, known as the *arc light*, the *incandescent light* and the *vapor light*.

ARC LIGHT. The arc light is the oldest and was for a number of years the only kind of electric light in use. It is produced by bringing the points of two sticks of carbon together and connecting them with opposite poles of a powerful electric current. When the current is turned on and the circuit completed, the points of these carbons are separated a short distance and a brilliant flame appears between them. The apparatus for an arc light consists of a frame for holding the carbons, and an electro-magnet, attached to the holder of the upper carbon. As soon as the circuit is completed, the current passes through this magnet, withdraws the positive pole to the proper distance, and maintains it in this position as long as the light is in operation. If an alternating current is used, particles of carbon pass for a part of the time from the lower to the upper carbon and both points maintain their shape and size; but with a direct current the particles pass from the upper (positive) to the lower (negative) carbon, and the positive point becomes hollow at the end, while the negative maintains its shape. Arc lights are very powerful and are used for lighting streets, docks and large public buildings, such as stores, depots and halls. They are usually enclosed in ground glass or porcelain globes, which diffuse the light more evenly and prevent the sharp lights and shadows produced by the light when not protected.

Electric Light

INCANDESCENT LIGHT. The incandescent light, which was introduced by Thomas A. Edison and other inventors is produced by passing a current over a small conductor, which is raised to a white heat. This conductor consists of a thread of carbon and is enclosed in an egg-shaped glass, from which the air has been exhausted. The incandescent lamp possesses several advantages over the arc lamp for lighting interiors. Its light is extremely steady, its temperature is low and the color of the light is more like that of the sun. Incandescent lamps can also be placed in any position desirable, and they do not vitiate the air by their combustion. For these reasons, and also because they are less expensive, incandescent lamps are quite generally used in lighting buildings, and in some instances they are employed for lighting streets, especially where the current has to be brought a long distance.

A new pattern of incandescent lamp, known from its inventor as the Nernst lamp, consists of a small nonconductor, known as the *glower*, which is placed in the top of a globe from which the air has not been exhausted. This lamp gives a particularly soft white light, which is pleasing to the eye and is evenly diffused. A Nernst lamp is also more brilliant than the ordinary incandescent lamp of the same size. These lamps are now in quite extensive use.

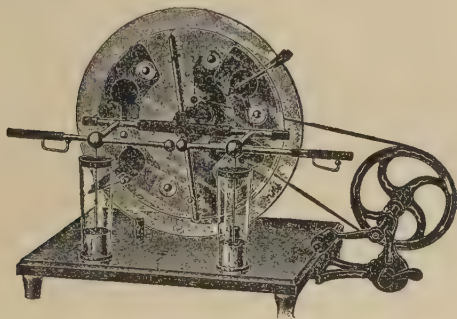
VAPOR LIGHT. A still later invention in electric lighting is the vapor lamp, which consists of a long glass tube from which the air has been exhausted, with a metal wire at each end. These wires conduct the current to the electrodes, one of which is mercury. The lamp is started by tilting the tube so that the mercury flows from one electrode to the other in a small stream. This makes connection between the electrodes, and when the stream of mercury breaks an electric arc is formed. The heat from this arc vaporizes the mercury, and this vapor becomes luminous. Since there is no opportunity for the vapor to escape, the mercury is used over and over and the lamp will operate as long as the vacuum remains perfect. The vapor lamp produces a brilliant white light, which radiates evenly in all directions. It is particularly valuable for lighting large areas, such as stores, factories, docks and other places where a strong light is required.

An electric lighting plant consists of the central station, where dynamos, usually operated by steam engines, generate the current; the main lines, which conduct this current to the various parts of the city, and the individual lines, over

Electric Machine

which the current is taken to supply light where it is needed. Where these individual lines connect with the main lines, the potential of the current is reduced by causing it to pass through transformers. See TRANSFORMER.

Electric Machine, any machine for producing powerful electrical effects. The name is, however, seldom applied to machines depending on magneto-electric principles, but is practically confined to two classes of machines—those which act by friction and those which act by electrostatic induction. The former are called *friction machines* and the latter *influence machines*. For many years the former were the only kind known, but they have now been almost superseded by the latter. In friction machines, the electricity is generated by the friction of either a glass cylinder or a circular glass plate against cushions covered with an amalgam of zinc and tin. The positive electricity, which is thus developed on the surface of the glass, is given off to an insulated brass conductor, furnished with teeth



ELECTRIC MACHINE

like those of a comb, the sharp points of which are nearly in contact with the glass. The negative electricity, which is at the same time generated on the cushion, must be provided with some means of escaping, or the action of the machine would soon stop. It is usually allowed to escape to the earth by a brass chain, connected with the cushions; but in some machines a negative conductor, connected with the cushions, is insulated, like the positive conductor, by a glass support. Negative sparks can then be drawn from this conductor at the same time that positive sparks are drawn from the other. Friction machines have been almost entirely replaced by influence machines, and descriptions of these are found in ordinary text-books on physics.

Electric Meter, an instrument for measuring and recording the amount of electricity used in electric lighting or by an electric motor. The

Electric Motor

meter in general use is a sort of electric motor, whose armature revolves in a horizontal direction. The axis of the armature is connected with a system of clockwork, which moves an indicator over dials that are graduated decimally. The speed with which the armature revolves depends upon the quantity of current passing through the meter. The unit of measure is the watt, that is, a current of one ampere, with a pressure of one volt, flowing for one hour. This unit is called a *watt-hour*. Electric meters should be accurate, as upon their reading is determined the compensation which the consumer pays the company furnishing the current. See ELECTRIC LIGHT.

Electric Motor, a device for driving machinery by the power of an electric current. The electric motor is constructed on the same plan as the dynamo (See DYNAMO). If a dynamo be supplied with a current of electricity from an outside source, it will run as a motor. The principle of the machine is the inducing of magnetism by an electric current. The current induces magnetism in the armature and the field magnet, and the reversed position of the poles in these magnets causes the armature to revolve. The revolution produces another reversal, and so the motion is continued. As long as the current is constant and the resistance even, the motor revolves at a uniform rate of speed.

While electric motors and dynamos are in principle interchangeable, in practice each machine is constructed for the work it is to perform and could not with advantage be used for the opposite purpose. Dynamos are much larger than motors, and the same dynamo may furnish power for a number of motors, as a dynamo of 100 horse-power may supply power to 20 motors of 5 horse-power each, or 2 motors of 50 horse-power each, and each of these may be located far from the others and from the dynamo.

The great advantage in the use of the electric motor is derived from the ease with which electric power can be carried a long distance and distributed with comparatively little loss. In a large factory the placing of electric motors at frequent intervals does away with the long lines of shafting, with their accompanying belts and pulleys, which are necessary when only one motor, as a steam engine or water wheel, is employed. The electric motor also makes it possible to utilize water power for generating the current, often hundreds of miles from the place where the motors are located. Because of

Electric Railway

these advantages electric motors are rapidly taking the place of large engines in factories. Many machines are now constructed with an electric motor attached. In such cases all that is necessary to operate the machine is to turn on the current. By the use of such a device, waste of power is eliminated, as the instant the work is completed the power can be shut off. The electric motor does not require a skilled operator, and with necessary attention to oiling and cleaning, it will usually run for years without repair. See ELECTRIC RAILWAY.

Electric Rail'way, a railway on which electricity is used as the motive power. The idea of operating railways by electricity was proposed by Jean Henry Cazal, a French engineer, in 1864, and at the industrial exposition in Berlin in 1879 a circular railway about one thousand feet long was exhibited. The first electric railway in the United States was constructed by Thomas A. Edison at Menlo Park, N. J., in 1880. The track was about ninety rods in length. Three years later Stephen D. Field of California exhibited an electric locomotive at an exposition of railway appliances in Chicago. The first suburban electric line in the United States was constructed from Baltimore to Hampden, Md., and put in operation September 1, 1885. Three years later the street railways of Richmond, Va., were equipped with electric motors, and from that time to the present the expansion of the electric railway has continued, until it is found in all large cities and in many small cities and towns. Indeed, many electric lines have been constructed between cities and towns distant from one another.

The motor apparatus of an electric railway consists of a central station, where a dynamo operated by steam or water power generates the electric current. This is distributed along the line through overhead wires, which are insulated from surrounding objects. On single track roads but one overhead wire is used, except at the switches, where two are always necessary. From the wire the current is drawn by the *trolley*, a small grooved wheel running on the trolley wire and attached to the end of a conducting pole that extends upward from the car. The trolley is connected with the motors, which are attached to the trucks of the car by wires extending down the side or end of the car. The motor is controlled by a compound switch, or controller, which is operated by the motorman. After it has been used, the current passes into the trucks of the car

Electro-chemistry

and from these to the rails, which are connected by copper wire at their joints, so that they return the current to the station from which it started. This is the plan in most general use for distributing power; but another, used on elevated roads and to some extent on lines which own their right of way through the country, is known as the *third rail* system. In this a third rail, either between the rails of the track or opposite one of them, supported on insulators, carries the current, which is brought in contact with the motor through a shoe that slides over the rail. The third rail is dangerous and cannot be used in places where there is liability that people or animals will come in contact with it. In 1910 there were over 40,500 miles of electric railways in the United States. Electric locomotives having great power are now in use on the New York, New Haven & Hartford Railroad for hauling both passenger and freight trains. They are also employed for hauling trains through the tunnels through which the New York Central and the Pennsylvania systems enter New York City; by the Grand Trunk in the Saint Clair Tunnel; by the Great Northern in the Cascade Tunnel and by the Baltimore & Ohio in entering Baltimore.

The development of the electric railway since 1900 has been very rapid, not only in the extension of the lines but also in the improvement of motors and cars. Electric lines now maintain a speed nearly equal to that of the best steam railways, and electric sleeping cars and dining cars are provided for travel between distant points. The great advantage of the electric railway lies in the reduction in expense of operating, and also in the fact that lines can be extended where it is either impracticable, because of expense, or impossible, because of grades, to construct railways operated by steam power.

Electric Weld'ing. See WELDING.

Electro-chemistry, *kem'is try*, that branch of chemistry which deals with the changes due to electricity, or with chemical changes that produce electricity. If two platinum rods are placed in a strong solution of common salt and are connected with a battery or other source of electricity, the current passing through the solution decomposes it in such a way that the sodium is set free at the negative electrode (See ELECTRODE), but combines immediately with the water, forming common, or caustic, soda. The chlorine is set free at the positive electrode and escapes in bubbles through the liquid. Here electricity causes a chemical change (See

ELECTROLYSIS). If a zinc rod is placed in a solution of zinc sulphate, and a copper rod is placed in a solution of copper sulphate, and the solutions are then separated only by a porous partition, a current of electricity will flow through the circuit when the rods are connected by wire. Here chemical action produces electricity. This is the principle upon which the development of the electric, or galvanic, battery rests. See **ELECTRIC BATTERY**.

Electro-chemistry is very generally employed in the arts and in the manufacture of soda and chlorine from salt, potassium chlorate from potassium chloride, carborundum (See **CARBORUNDUM**) and carborundum aluminum and other substances requiring the action of intense heat. This heat not only smelts the ore containing the required substance, but also causes certain chemical changes to take place, so as to set the product free. The operations of electro-chemistry most commonly seen are those of electroplating and electrotyping. See **ELECTRO-TYPING**.

Electrocution, a method of producing death by an electric current. It is used exclusively in criminal executions in several states of the United States, having been adopted on the recommendation of a board of investigators, for the reason that it is more humane than hanging. See **CAPITAL PUNISHMENT**.

Electrode, the term used to denote the terminals by which electricity enters or leaves a body upon which it acts. They are the same as *poles*. The positive electrode is known as the *anode*, and the negative is called the *cathode*. These terms were originally introduced by Faraday and were used only in connection with electrolysis, but they are now in general use wherever electricity is applied.

Electrolysis, the chemical decomposition of certain bodies, under the action of a current of electricity. The following are the main facts to be mentioned. When an *electrolyte* (a body capable of electrolytic decomposition) is subjected to a current of electricity of sufficient intensity, it is broken up into two elements; thus, if two platinum plates connected with the first and last plates of a battery be plunged in a trough containing a solution of chloride of silver, the chlorine is given off at the plate by which positive electricity enters, that is, at the plate which is connected with the copper plate of the battery, and the silver is deposited at the plate connected with the zinc plate of the battery. Three laws are well established, viz.:

1. *The electrolytic action of the current is the same at all parts of the circuit.*
2. *The same quantity of electricity decomposes chemically equivalent quantities of different electrolytes.*
3. *The quantity of the electrolyte decomposed in a given time is proportional to the strength of the current.*

It is known that the electric currents which pass through the ground from trolley lines to power houses—in fact, any other strong currents on the soil—tend to eat away the metal pipes which carry water, gas or sewage. Sometimes the decay is so serious that the pipes break and the gas or water escapes, to do great damage. Trouble that has resulted in suits between water and gas companies and railway companies has arisen in many cities. The remedy is one of prevention and consists in providing suitable lines for carrying return currents of electricity.

Electro-magnet, a piece of iron temporarily converted into a magnet by means of a current of electricity sent through a wire coiled round the iron. The wire is usually covered with silk, cotton, gutta-percha or some other insulator, to prevent the current from leaping across and to compel it to travel through the whole length of the wire. The more pure and soft the iron is, the stronger will its magnetism be while it lasts, and the more completely will it disappear when the current stops. Steel is less affected than soft iron for the time, but remains permanently magnetized after the current ceases. The iron which is magnetized by the current passing round it is called the *core*. It is frequently straight, the wire being wound upon it like thread upon a reel; but very frequently it has the shape of a **U**, or horseshoe, the wire being coiled round the two ends and the bend of the **U** left uncovered.

To predict which end will be the north pole, the following rule may be employed: Let the core be a straight bar of iron held in front of you pointing left and right; then if the current ascends on the side next you and descends on the further side, the north pole is to your left hand, the south pole to your right. If the straight bar is then bent into horseshoe shape, its poles will not be changed.

An electro-magnet is said to be *made* when the current is sent through its coil, and *unmade* when the current is stopped. In some applications of electro-magnets it is necessary to make and unmake them in rapid succession. It is then preferable for the core to consist of a bundle of iron wires, rather than of a solid bar.

Electro-magnetic Theory of Light

Electro-magnets are much more powerful than other magnets of the same size. They are used in electric motors. See **ELECTRIC MOTOR**; **ELECTRO-MAGNETISM**.

Electro-magnetic Theory of Light, a theory that light is caused by electro-magnetism (See **ELECTRO-MAGNETISM**). The theory holds that light and electricity come from the same source, and the discovery of the Roentgen rays, which have several characteristics of the electric current, tends to confirm the theory, though it is not yet generally accepted by leading scientists.

Electro-mag'netism, a term that in its broadest sense denotes the science which treats of the relation between magnetism and electricity. In a narrower sense, a magnetic effect produced by electricity is said to be *electro-magnetic*. The simplest experiment to illustrate this action is to take an ordinary surveyor's compass, hold just above it a copper wire parallel to the needle of the compass and then, while the wire is in this position, let its two ends be connected with the two poles of a galvanic battery. The needle will instantly turn away from its north and south position and will remain deflected as long as the current continues to pass over it. If the current flows from south to north, the north end of the needle is turned to the west, and if the current is in the opposite direction, the needle turns to the east. This is the easiest test for determining the direction in which a current is flowing through a wire; and it is the basis of the construction of galvanometers, the instruments chiefly employed for the measurement of currents (See **GALVANOMETER**). The current tends to make the needle take a position at right angles to the direction of the current; but as the earth tends to make the needle point north and south, the position actually taken is between the two. The fact that a current deflects a needle was discovered by Oersted of Copenhagen, in 1819. When a magnet is moved in the neighborhood of a wire or other conductor, the motion causes a current of electricity in the conductor; and a similar effect occurs if the wire is moved while the magnet remains at rest. In the experiment above described, of making a magnetic needle turn on its pivot by sending a current through a wire held above it, the motion of the needle produces for the time being a weakening of the current. If the needle were made by mechanical means to turn the contrary way, it would strengthen the current for the time being. If there were no original current, the turning of

Electro-motive Force

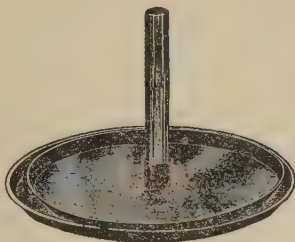
the needle to either side by mechanical means would produce a current in the wire. The current thus produced is always opposite in direction to that which would aid the motion. The principles of electro-magnetism are employed in the construction of electric motors (See **ELECTRIC MOTOR**).

Electrom'eter, an instrument used to measure the difference of potential between two conductors. Most of the electrometers in actual use are inventions of Sir William Thomson, who was the first to give accuracy to this branch of electrical measurement. His quadrant-electrometer is the instrument chiefly used, and its indications are usually given by means of a small movable mirror which, suspended by a fine thread, reflects a spot of light from a lamp on to a paper scale. When the two conductors which are tested have the same potential, the spot of light stands in the middle of the scale, and its movement to either side indicates the difference of their potentials. The instrument is sufficiently delicate to give a sensible displacement when the two conductors are the two plates of a single galvanic cell; and a displacement twice as great will be obtained by combining two such cells.

Electro-mo'tive Force, a phrase, commonly abbreviated into the three initial letters *e. m. f.*, which is of very frequent use in modern electrical literature, especially in connection with electric currents. The electro-motive force in a wire through which a current is flowing may be compared to the difference of pressures in a long, narrow horizontal pipe, through which water is flowing. As the difference of the pressure at the two ends of the pipe forces the water through, in spite of frictional resistance, so the difference of the potentials at the two ends of the wire forces the current through, in spite of the electrical resistance of the wire. This difference of potentials is another name for electro-motive force. The commercial unit of electro-motive force is the *volt*. Its magnitude may be inferred from the statement that the electro-motive force of a single cell of an electric battery is usually more than one volt and less than two and one-half volts. The highest electro-motive force usually permitted in wires which are liable to be touched by the public is about 200 volts. It is no unusual thing for a dynamo to give an electro-motive force of 1000 or 2000 volts. Currents produced by a source of high electro-motive force are often called *currents of high tension*. They are found to be necessary when several

arc lamps are to be supplied in series, and they are also necessary on the score of economy when power is desired to be transmitted by electricity to great distances. See **ELECTRICITY**, subhead *Voltaic Electricity*.

Electrophorus, *e'lek trof'or us*, a simple machine for generating static electricity. It consists of a glass plate, fastened to a board, and a metallic disk, either of brass or tin, to which is attached a handle of glass or hard rubber. To generate electricity by this machine, rub the glass with silk, then place the metallic plate upon it and touch the upper surface of this plate with the finger. On lifting the metallic plate by the handle, it will be found to be negatively electrified and may be discharged by a spark. The glass becomes positively electrified when rubbed with the silk, and when the metallic disk is placed upon it, it is electrified by induction. See **ELECTRICITY**, subhead *Induction*.



ELECTROPHORUS

Electroscope, an instrument for showing that a body is electrified. When a strip of gold leaf, folded in the middle, is suspended in a bottle or a jar by a wire that can be connected with the electrified body, an electroscope is formed. A more simple electroscope, but one not so sensitive, is made by tying two pith balls, about the size of a pea, to the opposite ends of a cotton or linen thread. When an electrified body approaches one of these sensitive instruments, its presence is indicated by a separation of the strips of gold leaf or of the pith balls, as the case may be.

Electrotyping, the process of making a metallic cast of type or an engraving by electricity. The form of type or woodcut is cleansed and dusted with finely powdered graphite. It is then laid face upward on a powerful press, a sheet of beeswax upon a lead plate is placed on top of the form and an impression is taken in the press. The wax mold so formed is coated with powdered graphite to make it a conductor of electricity. After the loose particles of lead are blown off, the wax mold is washed with a weak solution of sulphate of copper; then it is dusted with iron filings. It is then suspended in a bath consisting of two parts of sulphate of copper and one part of sulphuric acid diluted

somewhat in water. The wax plate is then connected with the negative pole of a battery, and a sheet of copper is hung in front of the wax and connected with the positive pole. The current is then turned on, and the copper is drawn from the plate and deposited upon the wax mold. After several hours the mold is removed from the bath, and the shell of copper is taken from the wax. It is then *backed up* with lead or type metal and planed smooth, when cold; the edges are then finished and the plate is ready for the press. The plate, when complete, is about one-eighth of an inch thick. It is then placed on a block or a frame to make it the same height as the type. Electrotypes are used in book and magazine printing and in the reproduction of engravings and halftones. See **HALFTONE**; **PRINTING**.

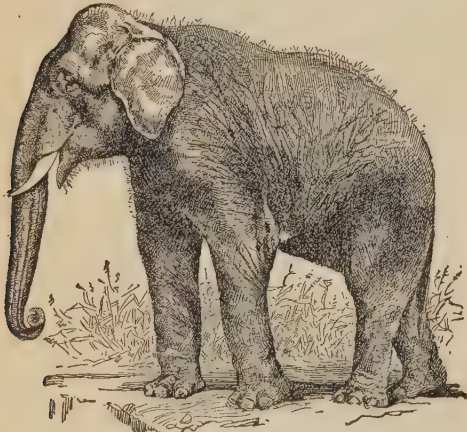
Elegy, *el'e jy*, in its widest sense, a serious poem with a melancholy tone; more narrowly, a funeral song. The following list includes most of those which are considered of highest rank, although there are many beautiful elegies which might be added: Gray's *Elegy Written in a Country Churchyard*; Shelley's *Adonais* (lament for Keats); Wordsworth's *Bereavement*; Matthew Arnold's *Thyrsis*; Lowell's *Threnodia*; Tennyson's *In Memoriam*; Spenser's *Lament for Astrophel*; Milton's *Lycidas*.

Elements, the simplest parts of which anything is composed; the ultimate indecomposable constituents of any kind of matter. In ancient philosophies the term was applied to fire, air, earth and water. In chemistry the name refers to those substances whose molecules contain but one kind of matter (See **ATOMIC THEORY**). The medieval chemists, absorbed in the study of metals and mineral substances, supposed that the metals consisted of an elemental sulphur and an elemental mercury, mixed together more or less perfectly and in different proportions. To these were subsequently added salt and some others, so that about the middle of the seventeenth century the first principles amounted to five, divided into two classes; the active, consisting of mercury or spirit, sulphur or oil, and salt; and the passive, consisting of water or phlegm, and earth. The names remained, not so much as denoting substances or ultimate principles as gradually coming to denote functions. Later studies brought again the idea of elementary substances; and the list of those considered as simple naturally changed with the change of theory introduced by Lavoisier, who considered the elements to be oxygen, nitrogen,

Elephant

hydrogen, sulphur, phosphorus and carbon, the metals and the earths. Boyle had already practically defined an element as a body not yet decomposed, the definition now commonly adopted. In 1910 eighty-one elements were known, a few of which are so recently discovered and so rare and costly that their properties have not yet been thoroughly studied. The most important elements are aluminum, antimony, arsenic, barium, bismuth, boron, bromine, cadmium, calcium, carbon, cerium, chlorine, chromium, cobalt, copper, gold, hydrogen, iodine, iridium, iron, lead, lithium, magnesium, manganese, mercury, nickel, nitrogen, oxygen, phosphorus, platinum, potassium, silicon, silver, sodium, strontium, sulphur, tin and zinc. On each of these there is an article in these volumes.

Elephant, *el' e fant*, the largest living land animal, usually regarded as being of two distinct species. The African elephant is taller, has



ASIATIC ELEPHANT

larger ears and less elevated head than its Asiatic brother. The Asiatic elephant, however, is more familiar than the African, being the only one which seems to be gentle in captivity. Sometimes elephants attain the height of fifteen feet, but usually a mature animal is nine or ten feet high and weighs from 4000 to 10,000 pounds. The body is very bulky, the legs are enormously large and almost straight and the short toes are covered by hoof-like nails. The skin of the elephant is very thick and coarse, and it bears only here and there a few scattered hairs. The most remarkable feature of the elephant is its long trunk, an extension of the nose through which the nostrils run to the very tip. This tip is exceedingly sensitive, and in one

Elephant

species it is furnished with two small projections; one, which somewhat resembles a finger, extends from the upper surface, and a shorter one projects from the lower part of the tip. The slender trunk can be turned and twisted in all directions, and by means of the sensitive tip the animal can pick up very small objects. The trunk is provided with very strong muscles and is altogether a useful organ in procuring food and is a powerful weapon of defense. With his trunk the elephant picks up and puts into his mouth all his food; he fills his trunk full of water, which he pours into his mouth, and with his trunk he makes a loud trumpeting noise, which is his signal of alarm or anger. On each side of the mouth is a long, rounded ivory tusk, which in well-grown males sometimes weighs as much as 200 pounds. Although the head of the elephant is enormously large, and its forehead broad, yet its brain is remarkably small. However, this does not show any lack of intelligence, for no animal, with the possible exception of the horse and dog, can be taught to do more things with seeming intelligence than the elephant.

Elephants live in herds of considerable size, but the old males sometimes leave the herds or are driven from them, and thereafter live solitary lives. They usually become vicious and exceedingly destructive to everything that comes in their way, including the plantations of the natives. Such elephants are commonly called rogues. The wild animals are caught in various ways. Sometimes pits are dug, into which the animals fall, and at other times a strong enclosure is built, into which the elephants are driven by fires or by men armed with guns or other noise-making instruments. In some localities trained elephants are kept and are sent out into the forests to make the acquaintance of wild ones and to lead them into captivity. Two tame elephants will select a single wild one and keep it so interested that the hunters can come up and put heavy chains about its legs. The animal is then tied to trees and held during the furious anger which follows its capture. After a long and tedious struggle, the elephant is subdued and then becomes tame and submissive.

Elephants have been known since the earliest times, and as far back as we have records in history they were trained by man to do various things and were frequently of great service in times of war. Hannibal had with him an army of elephants when he invaded Italy, and much of his success was due to the terror they inspired,

The animals have been used to a greater extent in India than in any other country. There they are used as animals of burden, great square saddles being fixed upon their backs. On occasions of pomp or display, the rich princes of India, themselves richly dressed, ride in elegant saddles, which look like handsome canopied chairs. Two or more people may occupy this saddle, and there is also a driver, who sits on the animal's neck. The chief value of the elephant, however, is in moving and transporting heavy loads. They are taught to do this with great skill; for instance, they are taught to handle lumber almost entirely by themselves. They will pick up great timbers, balance them carefully across their tusks, carry them as far as need be and lay them down in regular piles, after they have once been shown what to do.

Many elephants are held in captivity in the United States, altogether for show purposes. There is hardly a zoölogical garden in existence that does not have one or more of these animals. They are always great favorites with the children and learn to expect food and little attentions from every child that comes their way. Some of the herds that are exhibited by circuses and traveling shows are trained to do remarkable tricks.

Elephanta, *el'e fan'tá*, a small island in the Bay of Bombay. It is celebrated for its rock temples, or caves, the chief of which is 130 feet long, 123 broad and 18 high, supported by pillars cut out of the rock, and containing a colossal figure of the trimurti, or Hindu trinity, Brahma, Vishnu and Siva. This temple is still used at certain Hindu festivals.

Elephant Fish, a fish so named from a proboscis-like structure on the nose. It is called, also, *southern chimaera*. It inhabits the southern Pacific and the waters around the Cape of Good Hope and its flesh is palatable food.

El'ephanti'asis, a disease prevalent in the East Indies and other warm countries. One attack of the disease is followed by others, and after each attack some part of the body, usually the leg, becomes larger and larger, till it grows to enormous size. See MOSQUITO.

Elephantine, *el'e fan ti'ne*, a small island of Egypt, in the Nile, opposite Assuan, the ancient Syene. It is covered with ruins piled upon one another, the most important being a gateway of the time of Alexander, a small temple, dedicated to Khnum and founded by Amenophis III, and the ancient Nilometer, mentioned by Strabo.

Elephant Seal, the largest of the seal family. There are probably two species, one found only on the coast of California and western Mexico, the other in Patagonia, Heard's Island and some parts of the Southern seas. They vary in length from twelve to thirty feet and are about twelve feet in circumference. The nose is prolonged into a proboscis, which fact gives the seal its name. This seal also has heavy tusks and prominent eyes and eyebrows. Both species are becoming rare from their continual slaughter. See SEAL.

Elephant's Foot, the name given to a plant because of the shape of its rootstock, which forms a nearly hemispherical mass, rising a little above the ground and covered with a thick, corky bark. It has a slender, climbing stem, which grows to a length of thirty or forty feet, with small, heart-shaped leaves and greenish-yellow flowers. In Africa it is sometimes known as *Hottentot bread*.

Eleusinian, *el'u sin'e an*, **Mysteries**, the sacred rites anciently observed in Greece at the annual festival of Demeter, or Ceres, so named from their original seat, Eleusis. These mysteries consisted in a kind of miracle play, which represented the scenes Demeter passed through in searching for her daughter Persephone, and were given before the initiated. The ceremonies for the candidates consisted in walking from Athens to the sea for purification in the salt water; in a day of fasting and offering of sacrifices; in processions, and in going, on the ninth day, from darkness to the lighted shrine of the temple, where the candidates saw that which they were under oath not to reveal. Even slaves might be initiated. As a preparation for the greater mysteries celebrated at Athens and Eleusis, lesser Eleusinia were celebrated at Agræ on the Ilissus.

Elevated Railway, a railway built upon a framework above the level of the street. In the United States this framework is of steel, supported by steel pillars. Between these are stretched cross beams, upon which plate girders are laid (See BRIDGE, subhead *Truss Bridges*). The entire structure is thoroughly braced. Ties are laid on the top of the girders, and to these the rails are spiked. The stations are erected on elevated platforms, of the same height as the track, and are reached by stairways or elevators. The first elevated railway was built in New York City in 1867. In 1872 the line was extended, and now New York, Brooklyn, Chicago and Boston, in the United States, and Berlin,

Paris and Liverpool, in Europe, have elevated railways. At first steam was used for the motive power, but that has now been almost entirely replaced by electricity. On a few of the German elevated railroads the cars are suspended beneath the girders. These lines are known as *suspended railways*.

Elevator, a mechanical contrivance for hoisting loads from one level to another. That used for carrying grain or coal out of ships, or for similar purposes, consists of a series of boxes, or buckets, attached to a belt traveling round two drums, one above and one below. The elevator used for raising goods from one story of a building to another consists of a movable cage or platform, operated by water, steam or electric power. A *grain elevator* is a large building for storing grain. See GRAIN ELEVATOR.

El'gar, EDWARD WILLIAM, Sir (1857-), an English musician, born at Broadheath, near Worcester. He received a good musical education, studying on both the violin and organ. In 1882 he became conductor of the Worcester Instrumental Society and three years later, organist at Saint George's Church. He resigned in 1889 and soon began to devote himself to composition. Many of his works are widely known and are considered among the most finished productions of modern English musicians.

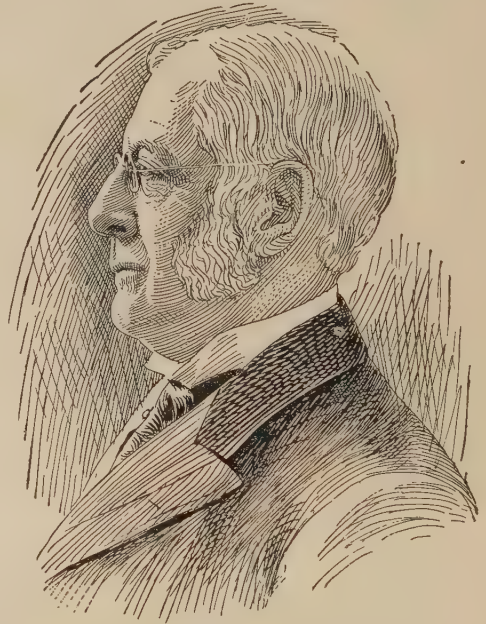
Elgin, *el'jin*, ILL., a prominent city of Kane co., 37 mi. n. w. of Chicago, on the Fox River and on the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads, and the Chicago, Elgin and Aurora electric line. It is in an agricultural and dairying region. The manufactures include watches, silverplate, condensed milk, shoes, flour and machinery. The educational institutions are the Elgin Academy, a Roman Catholic Seminary, a college of music and a manual training school, and the city also contains the Northern Illinois Hospital for the Insane and Gail Borden Public Library. Elgin was settled in 1835 and was chartered as a city in 1854. Population in 1910, 25,976.

Eli, one of the Hebrew judges, the predecessor of Samuel. He was high priest and judge for forty years. The news that his two sons had been slain and the ark taken in battle by the Philistines proved so severe a shock that he fell from his seat and died, at the age of ninety-eight. (*I Sam.* I-III.)

Eli'jah, the most distinguished of the prophets of Israel, flourished in the ninth century B. C., during the reigns of Ahab and

Ahaziah (*I Kings*, XVII-XXI). His special work seemed to be to pronounce vengeance on the kings of Israel for their apostasy. Elijah ascended to heaven in a chariot of fire, in the presence of Elisha, his successor.

Eliot, CHARLES WILLIAM (1834-), an American educator, born in Boston. He was educated at Harvard, and upon graduation he was appointed tutor of mathematics in the institution; later he became assistant in mathematics



CHARLES W. ELIOT

and chemistry. After spending seven years at Harvard, he went abroad to study the educational systems and methods of European countries, and on his return he was appointed professor of analytical chemistry in the Massachusetts Institute of Technology. In 1869 he was chosen president of Harvard University. Under his administration the work of the university was completely reorganized and its scope was greatly broadened. Doctor Eliot is recognized as the leading authority on higher education in the United States, and he is widely known as a speaker and writer on educational subjects. He retired in 1909. He is the author of the *Compendious Manual of Qualitative Chemical Analysis*, *The Working of the American Democracy*, *American Contributions to Civilization and Other Essays*, *University Administration* and of many essays and addresses. See HARVARD UNIVERSITY.

Eliot

Eliot, GEORGE (1819-1880), the pen name of Mary Ann, or, as she preferred to write the name in later years, Marian, Evans, one of the greatest of English novelists. She was the daughter of a Warwickshire land agent and surveyor and was born at Arbury. She received at Coventry an excellent education and, although obliged by her mother's death to take charge of the home at



GEORGE ELIOT

sixteen, she managed to keep up her studies, so that by the age of twenty-one she had a large, if decidedly unsystematic, fund of knowledge. The removal of her family to Coventry in 1840 led to her acquaintance with a number of free-thinkers, under whose influence she became an agnostic. Her first literary work was a translation of Strauss's *Life of Christ*, published in 1846.

In 1849, on the death of her father, she went to the Continent and spent some months at Geneva. On her return to England she became assistant editor of the *Westminster Review*, a position which was of great importance to her, because it led to her acquaintance with many of the foremost men of the day. Among her new friends the one who was destined to have most influence on her life was George Henry Lewes. They could not marry, as Lewes had a wife still living, from whom he could not secure a divorce; but they both regarded their union, which lasted until the death of Lewes, as possessed of all the force of a legal marriage. It was through the

Eliot

influence of Lewes that George Eliot made her first attempt at fiction, *The Sad Fortunes of the Reverend Amos Barton*, which appeared in *Blackwood's Magazine* in 1857. This was followed by *Mr. Gilfil's Love Story* and *Janet's Repentance*, and these were afterwards republished as *Scenes of Clerical Life*. The stories were enthusiastically received, and the praise of the unknown writer was increased on the publication of *Adam Bede*. *The Mill on the Floss*, with its portrayal, in Maggie Tulliver, of George Eliot's own youthful personality, and *Silas Marner* followed, and then she turned from her pictures of middle class English farm life to prepare for the writing of a historical novel, the scene of which should be laid in Italy. The result was *Romola*, her most ambitious, if not in all ways her most successful, work. In her remaining novels, *Felix Holt*, *Middlemarch* and *Daniel Deronda*, her scenes are again laid in England. A lengthy poem, *The Spanish Gypsy*, added little to the fame of its author. Mr. Lewes died in 1878, and George Eliot, although her grief was extreme, was married in 1880 to John Walter Cross. She lived only six months after her marriage.

Eliot, JOHN (1604-1690), "the apostle to the indians," was born in England and graduated at Cambridge University. In 1631 he removed to Boston and the following year connected himself with a church at Roxbury, Mass., which connection was not severed until a short time before his death. He learned the language of the indians and devoted himself to improving their condition. He translated the Bible into the indian tongue, published an indian grammar and with others made the *Bay Psalm Book*, an English metrical version of the Psalms, the first book printed in New England. At South Natick and at Newton are monuments to Eliot's memory.

Eliot, JOHN, Sir (1592-1632), an English statesman and patriot. He entered Parliament in 1614 and served later in the first three Parliaments of Charles I. He took part with Pym and Hampden in their opposition to the arbitrary measures of Charles and was a firm supporter of Parliament in its refusal to supply Charles with money until reforms had been instituted. He was several times imprisoned for his outspoken patriotism, but each imprisonment only made him more popular. At length he was confined to the Tower for his refusal to submit to royal authority, and when he was brought to trial he was sentenced to imprisonment during the king's pleasure. As even then he refused to

Elisha

make submission, his petitions for release were refused, and he finally died in prison.

Eli'sha, a Hebrew prophet, the disciple and successor of Elijah (*II Kings*, II, IX, XIII, XXI). Many miracles of prediction and cure, and even of raising the dead, are ascribed to him, but his figure is less original and heroic than that of his master. He held the office of prophet for fully sixty-five years, from the reign of Ahab to that of Joash.

Elix'ir, a word of Arabic origin, applied by the alchemists to a number of solutions employed in trying to change base metals into gold; also, a potion, the *elixir vitæ*, or elixir of life, supposed to confer immortality. Elixir is still used as a name for various popular remedies, which are composed of spicy and stimulating substances, dissolved in alcohol.

Eliz'abeth, (1533–1603), queen of England, daughter of Henry VIII and of Anne Boleyn,



QUEEN ELIZABETH

was born at Greenwich and was almost immediately declared heiress to the crown. After her mother had been beheaded (1536), Elizabeth was declared illegitimate, but she was finally placed after Edward and Mary in the order of succession. At the death of Edward, Elizabeth vigorously supported the title of Mary against the pretensions of Lady Jane Grey, but continued throughout Mary's reign an object of suspicion.

Elizabeth

In self-defense she made every demonstration of zealous adherence to the Roman Catholic faith, but her inclinations were well known. In 1558 Mary's reign came to a close, and Elizabeth was immediately recognized queen by Parliament. The first great object of her reign was the settlement of religion, to effect which a Parliament was called on January 25 and dissolved on May 8, with its object accomplished. The nation was prepared for a return to the reformed faith, and the Parliament was at the bidding of the court. The ecclesiastical system devised in her father's reign was reestablished, the royal supremacy was asserted and the revised prayer book was enforced by the Act of Uniformity. Elizabeth's first Parliament approached her on a subject which, next to religion, was the chief trouble of her reign—the succession to the crown. They requested her to marry, but she declared her intention to live and die a virgin.

For the most part Elizabeth and her ministers were on the side of peace, and they undertook no wars which were not absolutely necessary. Some support was given to the Huguenot party in France and to the Protestants in the Netherlands, so that throughout Europe Elizabeth was looked on as the head of the Protestant party. But her parsimony was too great ever to allow her to furnish substantial aid. Many of the political events of the reign were connected with Mary Queen of Scots (See MARY STUART). The detention of Mary in England, whither she fled to the protection of Elizabeth, led to a series of conspiracies, beginning with that under the earls of Northumberland and Westmoreland and ending with the plot of Babington, which finally determined Elizabeth to make away with her captive. The state of France, consequent on the accession of Henry IV, who was assisted by Elizabeth, obviated any danger from the indignation which the deed had caused in that country; and the awe in which King James stood of Elizabeth, and his dread of interfering with his own right of succession to England, made him powerless. But Philip II of Spain was not to be so appeased, the execution of Mary lending edge to other grievances. Accordingly, he refused to be satisfied with the sacrifice Elizabeth seemed prepared to make of her Dutch allies and dispatched against England the great Armada. Its fate, however, but brought added glory to the queen and her ministry.

The splendor of Elizabeth's government at home and abroad was sustained by such men as Burleigh, Bacon and Walsingham, and it was in

her choice of advisers that Elizabeth most clearly showed her wisdom. In her choice of personal favorites she was often less fortunate, as the names of Dudley, earl of Leicester, and the earl of Essex will show. It seems as though not only Elizabeth's chosen advisers, but men of all ranks, worked unconsciously to make her reign great and glorious. In the founding of the East India Company are found the beginnings of England's colonial empire, and such men as Drake and Frobisher carried the English flag to all parts of the world. Even in literature the names of Spenser, Shakespeare and Bacon have made it one of the most famous periods of all time.

Elizabeth, N. J., a town and the county-seat of Union co., on Staten Island Sound, 4 mi. s. e. of Newark and 12 mi. s. w. of New York City, on the New Jersey Central, the Pennsylvania and the Lehigh Valley railroads. The industries comprise the manufacture of sewing machines, paints, hardware and tools, besides iron founding and shipbuilding. The city takes a leading place in the shipment of coal and iron. It is the site of one of the battles of the Revolutionary War and was the point of exchange of prisoners during that period. The town was first settled in 1609 by Dutch and English in the employ of the East India Company, and it became a city in 1855. Population in 1910, 73,409.

Elizabethan Architecture, a style of architecture which prevailed in England during the reigns of Elizabeth and James I. It succeeded the Tudor style, from which it was derived, and with which it is sometimes confused. The ornaments of this style were heavy and gorgeous, rather than graceful and elegant. The pointed arch disappeared, open-work balustrades replaced the heavy Tudor battlements and a peculiar style of carving in flat relief patterns was used in all features. See ARCHITECTURE.

Elizabeth City, N. C., the county-seat of Pasquotank co., 46 mi. s. of Norfolk, Va., on the Pasquotank River and on the Norfolk &

Southern and other railroads. It is in an agricultural, lumbering and cotton region, has a good harbor and a considerable trade. Oyster cultivation is the principal occupation, and there are also shipyards, cotton, flour and planing mills and other industries. The city is a port of entry, and a state normal school is located here. The place was settled in 1793. Population in 1910, 8412.

Elk, a name commonly applied in America to a large deer of the Western states (See WAPITI). The name really belongs to the largest deer of Europe, which is very similar to the moose of the United States. It stands about six feet in height at the shoulders, has a



AMERICAN ELK

thick, large, clumsy head and broad, flat horns. It is grayish-brown in color, some parts being lighter than others. The true elk is still found in many of the wilder parts of Europe, as it is rigidly protected by law. Large numbers of elk remain in western Siberia. It is easily tamed and has been used as a beast of burden in Sweden.

The Irish elk was a large animal which is now extinct. It was distinguished by its enormous antlers, the tips of which were sometimes as much as eleven feet apart. Its remains are found not only in Ireland but in Scotland and England and on the Continent.

Elk'hart, IND., a city in Elkhart co., 100 mi. e. of Chicago, at the junction of the Saint Joseph and the Elkhart rivers, and on the Lake Shore & Michigan Southern and other railroads. The rivers furnish water power, and the city contains railroad shops, brass and iron works and manufactures of carriages, bicycles, printing presses, musical instruments, starch and paper. It has a public-school library, a Carnegie library, a high school, a business college and Elkhart Institute. Population in 1910, 19,282.

Elk'ins, STEPHEN BENTON (1841-1911), an American politician, born in Perry co., Ohio. He went to Missouri in his youth, graduated at the University of Missouri and was admitted to the bar. Later, in New Mexico, he gained extensive business interests and became delegate to Congress. He removed to West Virginia and became interested in coal mines and railroads. He was appointed secretary of war in 1891 and was Republican Senator from West Virginia from 1895 till his death.

Elks, BENEVOLENT AND PROTECTIVE ORDER OF, a benevolent and fraternal order, organized in New York City in 1868. Its purposes are chiefly social and philanthropical. The grand lodge of the order has power to create subordinate lodges, and these in 1912 numbered 1287, with a membership in the United States of 384,742. To date the order has dispersed about \$4,000,000 in benefits. The membership in the order is limited to white male citizens of the United States over twenty-one years of age. The official organ is the *Elks' Antler*.

Ellesmere, *elz'meer*, **Land**, the name given to a part of Arctic America. It is separated from Greenland by Smith Sound and is south of Arthur and Grinnell Lands. Snow and ice cover almost the entire tract.

Elliott, JESSE DUNCAN (1782-1845), an American naval officer, born in Maryland and educated at Carlisle, Pa. He entered the navy as midshipman in 1804 and distinguished himself in the War of 1812 by winning the first important naval battle on the Great Lakes, during which he captured two British vessels. At the Battle of Lake Erie he was second in command to Commodore Perry. His conduct in this battle, however, was severely criticised and has been the subject of heated controversy. He served under Decatur in the war against Algiers in 1815 and subsequently had other minor commands of squadrons and naval stations.

Ellipse', a figure in geometry ranking next in importance to the circle, produced when any

cone is cut by a plane, which passes through it not parallel to nor cutting the base. It may also be defined as the path of a point moving in a plane in such a way that the sum of its distances from two fixed points, called the *foci* (each, a *focus*), is equal to a given line, which will be the length of the ellipse. The area of an ellipse is πab , in which a is half its length, b , half its width, and π , about 3.14159. Kepler discovered that the paths described by the planets in their revolutions round the sun are ellipses, the sun being placed in one of the foci.

Ells'worth, EPHRAIM ELMER (1837-1861), an American soldier. At the outbreak of the Civil War he was commissioned colonel of a company of zouaves, which he had organized and which enlisted on the Union side. He tore down a Confederate flag from the roof of a hotel at Alexandria, Va., and while descending from the roof was shot dead by the proprietor, Jackson, who was immediately killed by a soldier. Ellsworth was accounted in the North the first martyr to the Union cause.

Ellsworth, OLIVER (1745-1807), an American statesman, born in Connecticut. He distinguished himself in state affairs and in the Continental Congress and was an influential member of the convention which drafted the Constitution of the United States. In 1789 he was elected United States senator from Connecticut and was chairman of the committee which organized the Federal judicial system. He was chief justice of the Supreme Court (1796-1799) and later served the nation and his native state in various high offices.

Ell'wood, THOMAS (1639-1714), an early writer among the Quakers. About 1660 he was induced to join the Society of Friends, and he suffered much persecution for his religion. As reader to Milton, whose intimate friend he was, he is said to have suggested to him the idea of writing *Paradise Regained*. In 1705 and 1709 he published the two parts of his *Sacred History*. His works include a poetical life of King David, the *Daiveis*.

Elm, a widely distributed genus of trees, found in both Europe and North America. No more graceful and beautiful tree exists than the American elm, which grows sometimes thirty feet in height before it branches and then separates into great divisions, with re-curving limbs. The tree grows with great rapidity and hence is a valuable shade tree for parks and city streets. In Boston Common are over a thousand fine elms. In Cambridge, Mass., in 1913, was

Elmira

still standing the "Washington elm," under which General Washington took command of the Continental Army on the morning of July 3, 1775. An American tree, smaller than the white elm, is known as *slippery elm*, because its inner



ELM

bark contains a mucilaginous substance that is used in medicine to soothe irritated surfaces. Elm wood is valuable for making hubs of wheels, cattle yokes and for other purposes. The annual cut in the United States is worth over \$6,000,000. It is thus not one of the most valuable trees.

Elmi'ra, N. Y., county-seat of Chemung co., 100 mi. s. e. of Rochester, on the Chemung River and on the Erie, the Lackawanna, the Pennsylvania and the Lehigh Valley railroads. The city is noted for its manufacturing establishments, chief of which are railroad shops, steel plate works, rolling mills, iron and steel bridge works, knitting mills, boot and shoe factories, table factories, glass works, engine and boiler works and tobacco factories. Elmira is the seat of Elmira College, Elmira Free Academy, the New York State Reformatory (See PRISON), the Steele Memorial Library and Arnot-Ogden Memorial Hospital. It has also a state armory, a United States government building, several charitable institutions and a number of fine parks. An interesting feature is a monument to Elmira's noted clergyman and author, Thomas K. Beecher. Near the city is a monument to General Sullivan, commemorating his victory over a force of indians and Tories in the Battle of Newtown at that spot in 1779. Elmira was settled in 1788. It became the county-seat in 1836 and was chartered as a city in 1864. In 1861 it became the state military rendezvous, and during the Civil War it was

Elyria

the seat of one of the Northern prisons. Population in 1910, 37,176.

Elmira Reformatory. See PRISON.

El'mo's Fire, SAINT, a meteoric appearance, often seen playing about the masts and rigging of ships. If two flames are visible (Castor and Pollux), the sailors consider it a good omen; if only one (Helena), they regard it as a bad omen.

El Paso, *el pah'so*, TEXAS, the county-seat of El Paso co., on the Rio Grande, 300 mi. w. of Dallas, being a terminus of the Texas Pacific, the Atchison, Topeka & Santa Fé, the Mexican Central railroads and an important point on the Southern Pacific. The city is in a cattle country and carries on a large trade. There are smelting works, cigar factories and other industries. Saint Joseph's Academy, a Congregational training school, a theological seminary and a school of mines are located here. The town was first settled in 1827 and became a city in 1869. It was long an unimportant village, but has developed rapidly since 1880. Population in 1910, 39,279.

El'wood, IND., a city in Madison co., 45 mi. n. e. of Indianapolis, on the Lake Erie & Western and the Pittsburg, Cincinnati, Chicago & Saint Louis railroads. It is in an agricultural district and exports considerable live stock, grain and farm produce. Natural gas is found in the vicinity, and the city contains flour mills, brickyards, iron works, wood-working establishments and extensive glass factories. Population in 1910, 11,028.

E'ly, RICHARD THEODORE (1854-), an American political economist, born at Ripley, N. Y. He was educated at Columbia College and in the University of Heidelberg, Germany. From 1885 to 1892 he was professor of political economy at Johns Hopkins University, and in the latter year he was made director of the school of economics and political science at the University of Wisconsin. His writings, though not purely socialistic in tone, disclose views which stamp him as a radical and progressive social reformer. Among his more important works are *French and German Socialism*; *Recent American Socialism*; *The Labor Movement in America*; *Cooperation in America*; *Problems of To-day*; *Socialism and Social Reform* and *Outlines of Economics*.

Elyr'ia, OHIO, the county-seat of Lorain co., 7 mi. s. of Lake Erie, on the Black River and on the Lake Shore & Michigan Southern and the Baltimore & Ohio railroads. The city

Elysium

is in an agricultural region, and sandstone is extensively quarried. There are also manufactures of bicycle and automobile supplies, saddlery, iron and steel products. Population in 1910, 14,825.

Elysium, *e liz'h'e um*, or **Elysian Fields**, among the Greeks and Romans, the regions inhabited by the good after death. By Homer, Elysium is considered as identical with the Isles of the Blessed—a place to which the gods carry their favorites while still alive; while by Vergil and the later poets it is represented as that part of the lower world where the souls of the good dwell.

El'zevir, a famous family of Dutch printers, who were prominent during the sixteenth, seventeenth and early eighteenth centuries. They printed editions of the classics and of French, German and Italian writers, and their works were distinguished for the elegance of their style. *Elzevir editions* of various works, still on the market, take their name from this family.

Eman'cipa'tion Proc'lama'tion, a state paper issued by President Lincoln, Jan. 1, 1863, by which all slaves in the states or parts of states actually engaged in rebellion and unrepresented in Congress, or not in possession of the Union armies, were freed. It was justified as a "fit and necessary war measure" and had been contemplated by Lincoln for many months. On Sept. 22, 1862, after the victory at Antietam, he had made a preliminary announcement of his intention. The proclamation aroused intense interest and was denounced by many as an unwarranted, unconstitutional and tyrannical act.

Embalming, *em bahn'ing*, the process of filling and surrounding bodies, particularly corpses, with aromatic and antiseptic substances in order to preserve them from corruption. The ancient Egyptians employed the art on a great scale and regarded it as a religious function. Other nations which practiced embalming, the Assyrians and Persians for example, seem never to have carried it to the point of perfection which the Egyptians attained (See MUMMY). In later times bodies have been preserved a long time by embalming, especially when they have remained at a low and uniform temperature and have been protected from the air. Of the various modern artificial means of preserving bodies, injections of a mixture of mercuric chloride, arsenic and zinc chloride into the blood vessels and cavities seems to be most effective. In most cases, of course, the object

Embroidery

is the preservation of the body for a short time only. Embalming is very generally practiced in the United States, because it makes possible the transportation of a body, and because it destroys the danger of contagion.

Embar'go, the prohibition of foreign commerce through the detention of vessels in port. When the vessels of a foreign state are detained, the embargo is said to be *hostile*; when a state detains its own vessels the embargo is called *peaceful*. The embargo policy was first used in the United States in 1794, in retaliation for hostile acts in restraint of American trade by Great Britain, but it was removed and was not again used until 1807, when the famous Embargo Act was passed, which detained both foreign and domestic vessels engaged in foreign trade. The act had but little effect upon France and England, the two countries at which it was directed, but it caused great hardship to American ship owners and was repealed in 1809, being replaced by the Non-Intercourse Act. Another act was passed in 1813, during the War of 1812.

Embez'zlement, the fraudulent appropriation of the personal property of another, held in the capacity of agent, servant or trustee. In order to constitute embezzlement, this taking must violate some confidence. Hence, if the user believes himself authorized to appropriate this money, he does not commit embezzlement. Also, the money must come into his possession by reason of his employment. In the case of the appropriation of such funds, the law presumes that the person has embezzled; however, if no criminal intent can be shown, he is released. The offense is a crime in the statutes of all states and is punishable by imprisonment, usually for a term of years.

Emboss'ing, the art of producing figures in relief upon plain surfaces, such as leather, paper, wood or bronze. Leather, paper and fabrics are embossed by means of presses, furnished with dies of the desired pattern. Embossing of metal may be done by hand, by beating up the metal from the under side, in which case the method is called *repousse work*. In architecture or sculpture the figures are said to be *alto*-, *mezzo*- or *bas-relief*, according to their prominence. In needlework, embossing is done by embroidering over figures which are padded with wool or some other material.

Embroid'ery, the art of making, with a needle and thread, ornamental designs on cloth or other materials. Embroidery is one of the oldest of decorative arts. The ancient Egypt-

tians and Assyrians practiced it to a considerable extent, and from them the Jews, Greeks and Romans learned it. The oldest known embroidery was done in cotton, linen and wool; later, silk came into greater favor. The Chinese and Japanese embroideries are very elaborate, most of the work being done upon silk, with the figures in brilliant colors of silk alone, or combined with gold and silver. Besides silk and gold threads, beads, spangles, pearls and gems are used in the embroidery of the Persians, Turks and Hindus.

In Europe, during the Middle Ages, the art was brought to the highest degree of perfection, and it was a favorite occupation among women of all ranks. In England it was of the highest importance, both as a recreation and as an industry. On clothing, as well as on curtains and wall hangings, rich embroidery was very fashionable. During the last half of the nineteenth century, machines were invented which make almost perfect imitations of hand embroidery. The best embroideries are made in Switzerland.

The principal stitches used in embroidery are chain stitch, cross, cushion, buttonhole, canvas, couching, rope, crewel and feather stitch. In embroidering elaborate designs the fabric is fitted and stretched over a frame.

Embryology, that division of anatomy which treats of the growth of individual organisms. The growth may start from an egg, a bud or a germ cell. The causes of development are unknown, though all forms are primarily due to the same cause. In one-celled animals, the cell increases in size without subdividing; in animals of more than one cell, cell division takes place. In the egg, the yolk serves as nutriment for the developing germ, which must be fertilized before growth commences.

Emerald, a well-known gem of pure green color, somewhat harder than quartz. It is a variety of beryl. Its color is due to the presence of chromium. Its natural form is either rounded or that of a short, six-sided prism. It is one of the softest of the precious stones, but is not acted upon by acids. Emeralds of large size and free from flaws are rare; the largest on record is said to have been possessed by the inhabitants of the valley of Manta, in Peru, when the Spaniards first arrived there. It was as big as an ostrich egg and was worshiped as *the mother of emeralds*. The ancients, who valued emeralds, especially for engraving, are said to have procured them from Ethiopia and Egypt. The finest are now obtained from Colombia. The

Oriental emerald is a variety of the ruby, of a green color, and is an extremely rare gem. Emeralds have been found in North Carolina.

Emerald Isle, a popular name for Ireland, given it on account of the rich green of its vegetation.

Em'erson, RALPH WALDO (1803-1882), an American poet and essayist, born in Boston, Mass. He graduated at Harvard in 1825, taught school for five years and in 1829 became



RALPH WALDO EMERSON

minister of a Unitarian church in Boston. As he had given up teaching because it was uncongenial, so he gave up preaching, although it seems that he was most successful, because he could not accept various rites of the Church, as that of the Lord's Supper. In 1832 he made a trip to England, where he became acquainted with Walter Savage Landor, Wordsworth, Coleridge and Carlyle. With Carlyle he established a firm friendship, and their correspondence was continued for years.

Returning to the United States, he began his career as a lecturer, and it was in this capacity that he was for a long time best known. His lectures on science, history and biography were very popular, by reason of their exhaustless fund of wit, illustration and anecdote. In 1835 he married Miss Lilian Jackson and took up his residence at Concord, Mass. His first volume, published in the following year, was *Nature*, in which he definitely set forth his creed; and this

increased greatly the reputation which he had made by lecturing. As a member of the group known as Transcendentalists, Emerson was one of the original editors of the *Dial*, a transcendental magazine, founded in 1840. Despite his identification with this movement, he had little to do with the Brook Farm scheme, of which he saw the impracticability from the beginning (See BROOK FARM).

Among Emerson's most important publications were *Essays* in 1841 and 1844; *Poems* in 1846; *Representative Men*, 1850; *The Conduct of Life*, 1860; *May Day and Other Poems* and *Society and Solitude*, in 1861. *The Sphinx*, *The Humble Bee*, *The Threnody*, written on the death of his son, *Days*, the *Snowstorm* and *Each and All* are some of his best-known and best-liked poems. Perhaps the most important of Emerson's messages to the world was his teaching that man may rise above circumstances and environment and may make of himself what he chooses; and it is largely through such philosophy as this that he has exerted so wide an influence. See halftone, CONCORD.

Em'ery, an impure variety of corundum, of blackish or bluish-gray color, chiefly found in shapeless masses and mixed with other minerals. It contains about 82 per cent of alumina and a small portion of iron, is very hard, is infusible and is not attacked by acids. The best emery is brought from the Levant, chiefly from Cape Emiri in Naxos. It also occurs in Spain. It is employed in cutting and polishing precious stones; in smoothing the surface of the finer kinds of lenses, preparatory to their being polished; in the polishing of marble; by cutlers, locksmiths, glaziers and other artisans. For all these purposes it is pulverized in large iron mortars or in steel mills, and the powder, which is rough and sharp, is carefully washed and sifted into eight or ten different degrees of fineness. Emery paper and emery cloth are made by laying a thin coat of glue upon the fabric, and dusting the emery from a sieve of the required size.

Emery wheels are made of a cement in which the ground emery is contained, and the excellence of the wheel depends upon the nature of the cement. The aim is to make a cement which will wear away with the emery and not leave the cutting material below the surface of the wheel. The cement must also be strong enough to withstand the centrifugal force so that it will not fly to pieces when the wheel revolves at a high speed. The wheel must have

an even texture throughout and must have the same density, so that one side will not wear out before the other and thus throw the wheel out of balance. Various kinds of cement are made—for example, leather, treated with acids and a strong glue, hard rubber, litharge, linseed oil, shellac, celluloid, silicate of soda, chloride of calcium, glue and oxychloride of zinc. The emery is prepared for mixing with the cement by rolling or crushing the rock. For cutting and grindstone purposes, the emery crushed under a stamp or in a rock crusher is the best, as the corners and edges of the particles are sharper; but for polishing, the emery ground between rollers is preferred. Wooden wheels with leather glued to their rims, and emery powder glued on to the leather, are used for polishing. The wooden wheel is built up from segments glued and pinned together. Buffing wheels for polishing brass, nickel-plated surfaces, copper, gold and silver are made of cotton or woolen cloth cut into disks and held together by iron flanges in the center.

Em'ery Wheel. See EMERY.

Em'e'u. See EMU.

Em'igra'tion. See IMMIGRATION.

Em'igres, *a me gra'*, the name applied to those royalists who fled from France during the French Revolution. After the storming of the Bastille in July, 1789, the first exodus took place, and later in the same year, at the time of the attack on Versailles, a larger number left the country. In 1791, when the Constitution was adopted, another large party left, most of them taking refuge in Holland, Germany or Switzerland. Throughout their exile the émigrés were constantly intriguing with foreign kings to bring about the restoration of the monarchy, and the knowledge of this fact drove the revolutionists to desperation and had much to do with many of the atrocities which were committed. Napoleon, on gaining the consulship, permitted the return of the émigrés. At the time of the Bourbon restoration, they were refused the right to regain their estates or privileges.

Em'in'ent Domain', the right of a state to appropriate the property of its citizens for public uses. This right is akin to the state's right to take property by taxation. It does not lead to confiscation, since it is always done through the forms of the law, always for the public good and usually for compensation. It is far more common in the United States than in any other country. Congress, with whom the power lies, is limited, in its exercise, by

several clauses of the Constitution, which declare that no person shall be deprived of property "without due process of law," and that "private property shall not be taken for public use without just compensation." The several states, which also possess the right of eminent domain, are also usually limited by similar provisions in their constitutions. The purposes for which the right may be exercised are many, according to the decisions of the courts, including not only improvements under the direction of the government, but the enterprises of persons in a private or semi-public capacity, such as railroads, bridges and ferries,

Emin Pasha, *a'meen pa shah'* (1840-1892), whose real name was Eduard Schnitzer, was an African explorer, governor and army surgeon, born at Oppeln, Prussia. He studied at Breslau, Berlin and at Königsberg, taking his degree in medicine. In 1865 he was appointed surgeon of the Turkish army, and ten years later he went to Egypt, where he became surgeon-general of the Egyptian army in the Sudan. In 1878 General Gordon appointed him governor of the equatorial provinces in the southern Sudan. He made various exploring expeditions, giving to the world much information in reference to the animal life and vegetation of that region and also much geographical knowledge. In 1883 he was cut off from the civilized world by the insurrection of the dervishes under the Mahdi, but held his position, and in 1887 the Egyptian government made him a pasha. He was rescued by Henry M. Stanley, but continued to stay with his people. In 1889 the provinces rose in revolt, and he was deposed and imprisoned, and after this he left the country. The next year he entered the service of the German East Africa Company and went on an exploring expedition into East Africa, where he was assassinated by two Arabs.

Em'met, ROBERT (1778-1803), an Irish patriot. He was expelled from Trinity College, Dublin, in 1798, on the ground of exciting disaffection and rebellion, and he then quitted Ireland. After spending some time on the Continent and receiving from Napoleon a promise of aid in a struggle for Irish independence, he returned to Ireland and became a member of the Society of United Irishmen, for the establishment of the independence of Ireland. In July, 1803, he was the ringleader in the rebellion in which Lord Kilwarden and others perished. He was arrested a few days afterward, tried and executed. His speeches in his own vindication have been regarded as models of patriotic eloquence.

Emo'tions, the higher feelings of the mind, which are aroused by ideas and exercised towards specific objects. They are sometimes called *ideal feelings* (See FEELING). Emotions differ from feelings in being more complex. Mere feeling is a simple act of the mind, but an emotion, such as love, brings into activity all the mental powers. One's love for one's mother is actuated by a knowledge of her, by recalling all she has done for one and by picturing what life might have been without her care. Perception, memory, imagination, reason and feeling are all employed. There is, however, no sharp line of division between mere feelings and emotions. We cannot say just where one ends and the other begins.

The emotions have been variously classified by different authorities. Professor William James says, "Any classification of the emotions is seen to be as true and as natural as any other, if it only serves some purpose." The most useful classification divides the emotions into the egoistic, the altruistic, the moral and the religious. The egoistic relate wholly to the self; the altruistic, such as love and anger, are exercised towards objects outside the self, and the moral and religious are combinations of both the egoistic and the altruistic.

The egoistic and altruistic emotions have the same relation to the self as do the egoistic and altruistic feelings (See FEELING, subhead *Ideal Feelings*). The esthetic emotion is purely altruistic, and its development has given rise to the branch of philosophy known as *esthetic* (See ESTHETICS). The moral emotions arise from relations of human beings to one another. They give us the sense of right and wrong, and in so far as they are responsible for our moral standards are strongly egoistic, while in so far as they are exercised towards others, they are altruistic (See ETHICS). The religious emotions are closely allied to the moral and arise from contemplating one's relation to a supreme being. They constitute the highest sentiments of which the mind is capable (See RELIGION).

The emotions are expressed in a variety of ways, by the eyes, by the countenance, by gesture and by the tones of the voice, as well as by words. When they are strong they affect the organic functions, such as breathing, circulation and digestion. The emotions increase in strength by continued excitement of them and they exert a strong influence over character and happiness.

Empedocles

When they pass beyond the control of the will, the emotions become passions. For culture of the emotions, see **FEELING**, subhead *Culture of Feelings*.

Empedocles, *em ped' o kleez* (flourished about 444 B. C.), a Greek philosopher of the Eclectic school. His teaching was that all things were produced by the action of Friendship and Strife on the four elements, earth, air, fire and water. He also taught that man was made up of the same elements as the universe, or else he would be unable to understand the universe. One legend told that Empedocles met his death by jumping into the crater of Mount Etna.

Em'peror, a title given to a ruler of superior rank to a king; specifically, the supreme ruler of an empire, that is, of a jurisdiction comprising a variety of nationalities or separate territories, as the emperor of Austria-Hungary; the emperor of Russia; Edward, emperor of India. See **IMPERATOR**.

Em'pire. See **EMPEROR**.

Employ'er's Liability. See **MASTER AND SERVANT**.

Empo'ria, **KAN.**, the county-seat of Lyon co., 60 mi. s. w. of Topeka, on the Atchison, Topeka & Santa Fé and the Missouri, Kansas & Texas railroads. The city is in a region devoted to farming and stock raising and contains large wholesale houses, foundries, woolen and flour mills and canning, carriage and other factories. A state normal school is located here, and the city also contains the College of Emporia and a conservatory of music. It was settled in 1856 and was incorporated in 1870. Population in 1910, 9058.

Ems, a watering place in Hesse-Nassau, on the Lahn River, about 10 mi. e. s. e. of Coblenz. It is noted for its many warm mineral springs, which are famous for their curative powers, especially in lung diseases. The place is visited by over 10,000 patients and many tourists every year. In the neighborhood are very important silver and lead mines. Ems was known to the Romans. In 1172 the counts of Nassau gained possession of it, and in 1866 it was united with Prussia. At this place, in 1870, the famous interview between King William of Prussia and the French ambassador, Benedetti, took place, which brought on the Franco-Prussian War.

E'mu, or **E'meu**, an Australian bird, related to the ostrich, cassowary and rhea. It is a large bird, sometimes weighing 130 pounds, and so

Enamel

is second only to the ostrich in size. Its feet are three-toed, and its feathers, which are double, are of a dull, sooty brown, those about the neck and head being hair-like in texture. It has small, useless wings, but it can run with great speed and uses this method of escape from enemies on the plains. If cornered, however, it can fight viciously, kicking backward with force sufficient to break a man's leg. The emu is very easily tamed and may be kept out of doors in temperate



EMU

climates. The flesh of the young is said to be a delicacy.

Emul'sion, a milky white medical preparation, consisting of an oily or resinous substance, made to combine with water by some substance that itself has the property of combining with both.

Enam'el, a glass-like glaze of various colors, fused to the surface of gold, silver, copper and other substances. The art of enameling, which is of great antiquity, was practiced by the Assyrians and by the Egyptians, from whom it may have passed into Greece and thence into Rome and its provinces, where various Roman antiquities with enameled ornamentation have been discovered. During the twelfth and fourteenth centuries, the Italians acquired great skill in enameling, and their work became famous in all the countries of Europe. The basis of all

kinds of enamel is a perfectly transparent and fusible glass, which is rendered either semitransparent or opaque by the mixture of metallic oxides. White enamels are composed by melting the oxide of tin with glass and adding a small quantity of manganese or phosphate of calcium to increase the brilliancy of the color. The addition of the oxide of lead, or antimony, or oxide of silver, produces a yellow enamel. Reds are formed by copper, and by an intermixture of the oxides of gold and iron. Greens, violets and blues are formed from the oxides of copper, cobalt and iron. Enamel is used for glazing the cheaper varieties of pottery and for coating iron vessels for domestic purposes, the protection of the insides of baths, cisterns, boilers and the like. Enameling in colors upon iron is now common, iron plates being thus treated by means of various mixtures, and words and designs of various kinds being permanently fixed upon them by stenciling.

Encaustic Painting, a method of painting practiced by the ancients, especially the Greeks, in which the colors were mixed with wax and resin and were softened by the aid of fire. Little is definitely known of the process, but the specimens left to us show the wonderful enduring qualities of the colors. *The Battle of Marathon*, painted by Polygnotus, for instance, was preserved for more than nine hundred years in an open portico at Athens. The art has been revived in modern times, but not to a great extent.

Encaustic Tiles. See **TILES**.

Encyclo'pædia or **Cy'clope'dia**, a systematic view of the whole extent of human knowledge or of particular departments of it, with the subjects arranged generally in alphabetical order. Varro and Pliny the Elder, among the Romans, attempted works of an encyclopedic nature, the latter in his well-known *Historia Naturalis*, or *Natural History*. Other ancient encyclopedic works were those of Stobæus, Suidas, Isidorus and Marcianus Capella. In the thirteenth century a work on a regular plan was compiled by the Dominican Vincent of Beauvais, in which was exhibited the whole sum of the knowledge of the Middle Ages. This work was called *Speculum Majus*, or *Speculum Triplex* (triple mirror) and was avowedly a digest of earlier works. The first compilation to which the name encyclopedia was given was one published in 1559 by Paul Scalich. A Latin encyclopedia, published by Heinrich Alsted in 1630, purported to tell all that was

known of all the sciences, and it was long the standard work of its class. These early works, while crude and unsystematic, were yet a step in the right direction toward the classification of knowledge. The subjects were arranged topically in these works, and it was not until 1674 that an important work with its subjects arranged alphabetically was issued. This was the *Dictionnaire historique* (historical dictionary) of Louis Moréri, which included articles on historical, mythological, genealogical and biographical subjects. In 1697 appeared Bayle's famous *Dictionnaire historique et critique*, which in its later revisions is still of value.

The first English alphabetical encyclopedia was the *Lexicon Technicum; or an Universal English Dictionary of Arts and Sciences*, published in 1704. Ephraim Chambers published in 1728 his *Cyclopaedia; or an Universal Dictionary of Arts and Sciences*, which had some distinctive features, especially the use of cross-references to facilitate topical reading, and which had considerable influence on succeeding works of its kind, both in England and on the Continent. The famous French *Encyclopédie*, edited by Diderot, D'Alembert, Rousseau and others, was intended at first as a translation and revision of Chambers's work, but grew into something much more ambitious (See **DIDEROT**, **DENIS**). Of a somewhat different type from the dictionary style of encyclopedia, described above, is the *Encyclopaedia Britannica*, first published in 1768, which laid stress on important articles on general subjects, rather than on numerous short articles on the subdivisions of these subjects.

Besides those mentioned above, the chief encyclopedias in English include a new edition of Chambers's *Encyclopaedia*, in ten volumes; the *Encyclopedia Americana*, in sixteen volumes; Johnson's *Universal Cyclopaedia*, in eight volumes; later editions of the *Encyclopaedia Britannica*, the latest in twenty-nine volumes, and the *New International Encyclopaedia*, in twenty volumes. Of French encyclopedias the most important are the *Encyclopédie des gens du monde*; the *Encyclopédie moderne*, and the *Encyclopédie du XIX^{ème} siècle*. The German *Konversations-Lexikon* of Brockhaus, in seventeen volumes, and the *Konversations-Lexikon* of Meyer, in eighteen volumes, with supplementary numbers, are among the best and most scholarly of any encyclopedias. The Chinese encyclopedia, complete in 5040 volumes, is one of the most remarkable literary under-

takings ever projected, and has twenty volumes of index alone.

Endicott, JOHN (1588?-1665), one of the founders and the first governor of Massachusetts Bay Colony. He was born in Dorchester, England, and joined the exodus of Puritans to the New World in 1628. He was acting governor of the colony during the following year and was elected governor in 1644, 1649 and annually from 1651 to 1665, except 1654. Endicott was a warm disciple of Roger Williams and always displayed independence of established custom and authority. He was responsible for the establishment of a colonial mint in 1652. During his administration several Quakers were put to death in Boston.

Endicott, WILLIAM CROWNINSHIELD (1827-1900), an American politician and jurist, born at Salem, Mass., educated at Harvard University. He was admitted to the bar in 1850 and was chosen to the state supreme court in 1873, serving for ten years. Until the dissolution of the Whig party he acted with that organization, but then became a Democrat. In 1884 he was candidate for governor of Massachusetts, but was defeated, and in the following year he became secretary of war in Cleveland's cabinet, serving throughout his term.

Endless Screw, a mechanical contrivance, consisting of a screw, the thread of which gears into a wheel with skew teeth, the obliquity corresponding to the angle of pitch of the screw. The endless screw is generally employed as a means of producing slow motion in the adjustments of machines, rather than as transmitter of any great amount of power.

Endogenous, *en doj'e nus*, **Plants**, formerly the name of one of the large primary classes into which the vegetable kingdom is divided. It has now given way to the name *monocotyledons*. See BOTANY.

Endym'ion, in Greek mythology, a shepherd of great beauty, who won the love of Diana. Seeing him one night as he lay asleep on a hillside, Diana left her chariot and kissed him. This she repeated every night, but while Endymion waked enough to gaze into her eyes, he was never able to make any response. Fearful lest age should lessen his beauty, Diana begged for him from Jupiter the gift of endless sleep and carried him off to a cave on Mount Latmos.

En'emy, in international law, a nation at war with another, or any one of its citizens or officers, from the standpoint of the other nation and its citizens and officers. A state of enmity does not

exist between two nations until they are actually at war. While any officer of a belligerent nation is considered, strictly, an enemy of the other party to the struggle, modern usage has practically determined that minor civil officers, not in any way connected with the war, and non-combatants of nations at war are not liable to capture, detention or punishment. All commercial relations, however, are suspended. For a statement of the general rules of international law in force during times of war, see articles WAR; INTERNATIONAL LAW; NEUTRALITY.

Energy, *en'ur jy*, in physics, the power which a body or system possesses for doing work. Energy is of two kinds, *potential*, or possible, energy, which is energy of position, like that of a sledge in air or a stone resting upon a support to which it has been elevated, or the force which lies dormant in such mixtures as gunpowder and dynamite. In all these cases the energy is present and only needs the necessary conditions to change it from possible, or passive, to *kinetic*, or active, energy. This energy produces motion, like the sledge descending on the head of a stake, the stone rolling downhill or the powder in explosion.

CHANGE OF ENERGY. Energy can be changed or transformed from one sort to another, but it can be neither created nor destroyed. An electric light plant using steam power affords an excellent illustration both of the change of potential to kinetic energy and also of the change from one kind of energy to another. The potential energy in coal is made active by burning, which causes it to give off heat. The heat is used in changing the water to steam and this is then transformed to motion in the engine. The motion is imparted to the dynamo, which in turn generates the electric current, which is changed back to heat in the electric light. Some of the heat generated by the coal is consumed in the running of the engine and the dynamo and in traversing the wires, so that it does not all appear as light; yet it is all used in one form of energy or another.

En'field, CONN., a town of Hartford co., 18 mi. n. of Hartford, on the Connecticut River and on the New York, New Haven & Hartford railroad. There are powder mills, carpet factories, bicycle factories, steam brick works and various other manufactories, and the tobacco trade is especially important. The town has a community of Shakers, which is known as Shaker Station. Population in 1910, 9719.

Eng'elmann, GEORGE (1809-1884), a German-American botanist, who was educated in the universities of Heidelberg and Berlin, and practiced medicine in Saint Louis, edited a German newspaper and acted as botanist in the government surveys of North America. By his will he left to the Missouri Botanical Gardens his large herbarium and his library.

Engine. See GAS ENGINE; STEAM ENGINE.

Engineering, in its broadest meaning, the art of construction. Engineering is one of the oldest of arts, and the remains of Egyptian temples and tombs as well as the pyramids are evidences that these people were well versed in engineering. The ruins of ancient Babylon and other cities of the East also bear evidence of the skill in engineering possessed by the Assyrians, the Greeks and other ancient nations. But the Romans attained the greatest skill in this art, as shown by the magnitude of their works and the architectural devices employed in their construction. The development of numerous lines of industry, each of which calls for special applications of engineering, has led to the division of the art into several sections, all of which may be graded under two main divisions, known as *military engineering* and *civil engineering*. Military engineering deals with those engineering operations connected with warfare, both on land and sea. That department connected with the construction of ships and other naval affairs is termed *marine engineering*, and the work of the military engineer is related to the construction of roads, fortifications and other defenses.

Civil engineering is the term applied to all kinds of construction not designed for military or naval purposes. It pertains to the construction of large buildings, bridges, canals, harbors, railroads, street railways and numerous other works. This branch of the art is subdivided into numerous departments, such as *electrical engineering*, *mechanical engineering* and *sanitary engineering*, each of which has become highly specialized.

England, the chief political division of the United Kingdom of Great Britain and Ireland, occupying the southern portion of the island of Great Britain. It is separated from Scotland by the Cheviot Hills, the River Tweed and Solway Firth. Its greatest length from John o'Groats, in the northeast, to Saint Alban's Head, on the south, is 365 miles, and its greatest width from Land's End to North Foreland is 320 miles. The area, exclusive of the Channel Islands, is

50,933 square miles, or a little more than that of the State of New York. The coast line is very irregular and measures about 2000 miles. On the east are the following important indentations, each of which is the estuary of one or more rivers: Tees Bay, the Mouth of the Humber, the Wash and the Mouth of the Thames. On the south are Spithead, Lyme Bay and Plymouth Sound, and on the west are Bristol Channel and the estuary of the Severn, south of Wales, and the estuary of the Dee, north of Wales, and Morecambe Bay and Solway Firth. England and Wales are separated from Ireland by the Irish Sea and Saint George's Channel; the English Channel, Strait of Dover and North Sea separate England from Europe.

SURFACE AND DRAINAGE. The northern and northwestern portion contains a number of ranges of mountains and hills which, with some interruptions, extend north and south from Scotland through England into Wales. These throw out numerous branches on both sides, but particularly to the west, where all of the highest summits are found. The northern portion of the main range of mountains is known as the Pennine chain. The highest summit of this range is found in Derbyshire and rises to the height of 2080 feet, while the highest summit of northern England, Scawfell, also in this region, has an altitude of 3210 feet. West of the Pennine range and its adjoining Cumbrian range is another, whose average altitude is greater. This extends southward and covers the greater part of Wales. South of the Bristol Channel and extending into the point of land comprising the counties of Somerset, Devon and Cornwall, is the Devon range, which is much lower than the ranges in the north. In the extreme northwest, between Morecambe Bay and Solway Firth and occupying the counties of Cumberland and Westmoreland, is the Lake District, so called because it contains a number of small mountain lakes, noted for their beauty. All of the southern and eastern portion of England is low land and consists of rolling country, with slight rounded elevations separated by more or less broad, undulating valleys.

England is well supplied with rivers, many of them of great importance to industry and commerce. Nearly all of these flow into the North Sea. The most important streams are the Thames, Ouse and Humber, flowing into the North Sea, and the Mersey and the Severn flowing into waters tributary to the Atlantic. Other streams worthy of mention are the Tyne, Wear

England

and Tees, in the northeast, and the Eden, Ribble and Dee, in the northwest.

CLIMATE. See GREAT BRITAIN, subhead *Climate*.

MINERAL RESOURCES. England contains extensive deposits of coal, iron ore and clays, and it furnishes about three-fourths of the entire mineral products of the United Kingdom. Minerals of lesser importance are copper, zinc, tin, salt and gypsum. The coal areas extend irregularly from north to south, slightly west of a line drawn through the center of the country. The most important coal-producing counties are Durham, Lancashire and Yorkshire, in the north. The next most important region is that round about Newcastle. The iron ore and limestone necessary for a flux in smelting occur in or near the coal regions. Tin in quite large quantities is found in Devon and Cornwall. Since England contains an abundance of coal and is so situated that this can be transported easily, a considerable quantity is exported to adjoining European countries.

FISHERIES. The fisheries are important, and the larger part of the fish taken by the United Kingdom is obtained off the coasts of England and Wales. The total value of the annual catch is about \$32,000,000. The most important centers of the industry are Grimsby, Hull and Yarmouth, and nearly all of the product goes to London, which is the largest fish market in the world. Herring, haddock, cod and mackerel are the varieties taken in largest numbers.

AGRICULTURE. Over three-fourths of the land is under direct or indirect cultivation, and less than one-eighth of it is left in a natural state. Nearly all of the land is held in large estates, which are subdivided into small farms and rented to permanent tenants. Since these estates are inherited by the oldest sons in the families, their management is seldom changed, and it is a very difficult matter to divide them. The land is kept in a high state of fertility by the use of fertilizers and by the most approved methods of tillage. Wheat, oats and barley are the principal cereal crops. Green crops and root crops are extensively grown for forage. Besides these are potatoes, beets, beans, peas and hops, and in the southern part of England, apples and other fruit form an important product. The raising of live stock is also an important line of agricultural industry, and England has long been noted for her excellent breeds of cattle, sheep and swine. It is from her that the Durham and Devon cattle, Southdown, Cotswold and Leices-

England

tershire sheep and other valuable varieties of domestic animals have been obtained (See CATTLE; SHEEP). In many sections intensive farming, similar to that practiced in the truck gardens around the large cities in the United States, is common, and the land yields large crops, but notwithstanding this the returns are far from sufficient to supply the people of the country with food.

MANUFACTURES. Next to the United States, England is the greatest manufacturing country in the world, and manufactures form the leading industry, more than five times as many people being engaged in manufacturing as in agriculture. The chief manufacturing centers are in the vicinity of the coal and iron fields, extending from the center of the country northward along the western side. The most important industry is the manufacture of textiles, in which cotton and woolen goods take the lead. Manchester is the chief city of cotton manufacture and the largest center of this industry in the world, and the county of Yorkshire contains the largest number of woolen mills, the center of the industry being at Leeds. The great iron foundries are found in the central counties in and about Birmingham and Sheffield, the latter city being noted for its manufacture of cutlery of all kinds. Aside from these great industries, there are numerous others, such as the manufacture of pens, pins, needles and countless other small articles and small wares. In itself each of these industries is comparatively unimportant, but when taken together, they constitute an important factor in the manufacturing industry of the country and of the world.

The position which England has held for so long as a manufacturing nation is due to the presence of large quantities of coal and iron, to her moist and temperate climate, to facilities for reaching the markets of the world and, perhaps more than all else, to the ingenuity and industry of her people. It was in this country that the four inventions which have revolutionized the industries of the world were produced. These were the power loom, invented by Edward Cartwright; the steam engine, by Watt; the locomotive, by Stephenson, and the Bessemer process of manufacturing steel. For fuller descriptions see, respectively, the articles on LOOM; STEAM ENGINE; LOCOMOTIVE; STEEL, subhead *Bessemer Steel*.

TRANSPORTATION AND COMMERCE. See GREAT BRITAIN, subhead *Transportation and Commerce*.

GOVERNMENT AND RELIGION. See GREAT BRITAIN, subheads *Government* and *Religion*.

EDUCATION. See EDUCATION, NATIONAL SYSTEMS OF, subhead *Great Britain*.

LITERATURE. See LITERATURE, subhead *English Literature*.

ART. See PAINTING; SCULPTURE, subhead *England*.

ARCHITECTURE. See ARCHITECTURE, subhead *Gothic Architecture*.

INHABITANTS AND LANGUAGE. The ancient inhabitants of England were known as Britons and were a Celtic people (See CELTS). At the Roman conquest the people occupying what is now England were brought under Roman rule, while some of the harder tribes fled to the north and maintained their independence. On the evacuation of the island by the Romans, after a rule of about five hundred years, the inhabitants on the north encroached upon those living in the former Roman territory, and the latter invited the Saxons, Angles and Jutes to assist in repelling these northern tribes. After rendering the assistance called for, these people settled in England and intermarried with the Britons. Later, in the eleventh century, there was an invasion of the French under William of Normandy. As a result, the English people are the offspring of intermarriages between these various nationalities. They are characterized by love of liberty, great endurance, strong intellectual attainments, mechanical skill and executive ability. From England they have spread to America, Africa and many other parts of the world. English is the language universally spoken, and the proportion of other nationalities in the country is comparatively small. The population in 1911, exclusive of Wales, was 34,043,076.

CITIES. Besides London, the capital, the great commercial center of the world, with a population of over 7,000,000, there are in England fourteen other cities having a population of over 200,000. These are, in the order of their importance, Liverpool, Manchester, Birmingham, Leeds, Sheffield, Bristol, Bradford, West Ham, Kingston-upon-Hull, Nottingham, Salford, Newcastle-upon-Tyne, Portsmouth and Leicester. Each of them is described under its title.

HISTORY. Previous to the time of the Roman conquest of Britain in the first century B. C., little is known of England beyond the fact that it was frequently visited by the Phoenicians, the Carthaginians and the Greeks, for the purpose of obtaining tin. With Caesar's invasion

of the country in 55 B. C., its recorded history begins. It was not, however, until the time of Claudius, nearly one hundred years later, that a serious attempt was made to reduce Britain to the condition of a Roman province, and it was not until the time of Agricola that the inhabitants may be said to have been in any degree Romanized (See AGRICOLA). The entire island did not submit to the Romans at any period, and at various times walls were built across it to ward off the attacks of the northern tribes whom the Romans had been unable to subdue. Under the Roman dominion the southern part of the island advanced considerably in civilization. Flourishing towns were built, great roads were constructed and Christianity was introduced.

But soon after the beginning of the fifth century, the Romans found it necessary to withdraw their armies from Britain, and the inhabitants of the country, who had been for centuries protected by the Romans, found themselves utterly unable to repel the invasions of their northern neighbors. They therefore called on the Jutes to aid them, but soon found that the Jutes intended to repay themselves by making settlements on the island. Other tribes from the mainland, chief among them the Angles and the Saxons, also descended upon Britain and soon overran the country.

Of the political divisions into which the conquered territory was divided by the Angles and Saxons, the most conspicuous were the seven small kingdoms commonly known as the *Hep-tarchy*. Gradually the more powerful of these came to dominate the weaker ones, and by 827 Egbert, king of Wessex, had made himself king of the entire country. From this year the kingdom of England (Angle-land) may be considered to date, and Egbert's descendants ruled in England, with the exception of a short period of Danish power, until 1066. In the early strife between the Angles and the Saxons, the civilization of the Romans had been completely overthrown, and Scandinavian mythology had taken the place of Christianity. By the sixth century, however, the Christian religion had been reintroduced by Saint Augustine and his successors.

Meanwhile, the Danes had been constantly harassing the coast, and they gradually obtained a firm foothold on the island. When Alfred the Great ascended the throne, in 871, he found them practically masters of his kingdom. But he succeeded in reducing their power, confined them to a certain part of the country and forced

them to do him homage (See ALFRED THE GREAT). The successors of Alfred, Edward (901-925) and Athelstan (925-940), were again obliged to contend with the Danes, who were constantly issuing from the Danelagh, the territory to which Alfred the Great had confined them. Among the chief political characteristics of the rule of the Saxons in England was the growth of the power of the king, and the early establishment of the Witenagemot, without the sanction of which the king was supposed to undertake nothing of importance. A really strong king, however, might often set aside the Witan and rule almost absolutely (See WITENAGEMOT).

By 1013 the Danes under Sweyn had made themselves masters of the greater part of England, and Sweyn's son Canute, who succeeded him in 1016, firmly established the Danish rule. Harold and Hardicanute succeeded Canute, and on the death of Hardicanute in 1042 the English line again came to the throne in the person of Edward the Confessor (See EDWARD THE CONFESSOR). Edward died in 1066, and Harold, his brother-in-law, was chosen king (See HAROLD I). He ruled but a few months, however, as William of Normandy, who claimed the throne partly through his relationship to the royal Saxon line, partly through a promise which he said had been made him by Edward the Confessor, descended upon England in 1066 and defeated Harold at the Battle of Hastings. By Christmas day William had brought a large part of the island into subjection, and on that day he was crowned in London. It was not until some years later, however, that the complete subjugation of the island was accomplished (See WILLIAM I).

At William's death in 1087 his second son came to the throne as William II, and he was followed on his death in 1100 by his younger brother Henry. Henry's reign was much disturbed by the attempts of Robert, duke of Normandy, eldest son of William I, to gain the throne, but Henry was able to strengthen his hold on the kingdom and even to gain possession of Normandy. Henry had chosen as his successor his daughter Matilda, wife of Geoffrey Plantagenet, count of Anjou, but Stephen, a grandson of William the Conqueror, raised an army in Normandy and attempted to seize the throne. After years of fighting with varying results it was agreed that Stephen should reign until his death, and that he should accept as his successor Henry, the son of Matilda. Stephen

lived but a year after this arrangement was made, and in 1154 Henry, the first of the Plantagenets, came to the throne as Henry II.

Henry II proved to be one of the strongest of English kings. He put down the great barons who had established themselves in their castles and made themselves scourges to the country about them, and he established a just and orderly government. One of the most important events of his reign was his contest with the Church, the powers of which, despite his enforced submission to the pope after the murder of Becket, he very materially lessened. (See BECKET, THOMAS A.; CLARENDON, CONSTITUTIONS OF). Henry, whose possessions in France exceeded in extent his English kingdom, had spent little of his time in England, and his son, Richard I (1189-1199), who succeeded him, was in England only one year during his reign. In his absence the nobility succeeded in increasing their power at the expense of the royal authority. John (1199-1216), who succeeded Richard, while in some ways an able man, was untrustworthy and weak, and during his reign England lost all of her possessions in France. This separation of the two countries in the end worked good to England, as it compelled the Norman barons in England, who up to this time had thought of France as their home country, to recognize themselves as subjects of an English king. John's weakness was beneficial to England in another way, because it allowed the barons, with the support of the people, to wrest from him the Great Charter of Liberties (See JOHN; MAGNA CHARTA). John's son, Henry III, (1216-1272) succeeded him, and much of this reign was taken up with troubles with the barons, which in the end resulted in a confirmation of the Great Charter. It was during this reign that the first House of Commons was assembled. See HENRY III; MONTFORT, SIMON DE.

Edward I (1272-1307) proved himself a stronger king than his two predecessors and reduced the country to order. It was in his reign that Wales was finally united with England, and that the fierce struggle with Scotland began, which continued, at intervals, for centuries. Edward, by his defeat of William Wallace, gained some advantage in Scotland, but under Edward II this was lost, and after the victory of Robert Bruce at Bannockburn in 1314, the independence of Scotland was recognized (See EDWARD I; WALLACE, WILLIAM; BRUCE, ROBERT; EDWARD II). With Edward III (1327-1377) began the long struggle with France.

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known as the Hundred Years' War (See HUNDRED YEARS' WAR). Edward, with his son, the Black Prince, won brilliant victories, which, however, meant no permanent advantage for England, while the great expense of the war was a serious drain on the country. Two important results of the contest to England were the strengthening of the national feeling, which resulted from the union of the Normans and Saxons against France, and the increased power which Parliament secured because Edward III was dependent upon it for supplies.

Richard II (1377-1399) proved but a weak king, and after several uprisings, chief of which was the insurrection under Wat Tyler (See TYLER, WAT), he was dethroned by Henry, duke of Lancaster, who came to the throne as Henry IV. The persecution of the Lollards and the frequent rebellions headed by supporters of the deposed king, Richard, were the chief events of this reign, which, however, was of importance in the growth of constitutional government in England by reason of Henry's respect for the authority of the Parliament which had proclaimed him king. The reign of Henry V (1413-1422) was spent chiefly in the prosecution of the Hundred Years' War, and so successful were the English that Henry was able to wring from the French king, Charles VI, a promise that the English king should succeed him on the throne of France. After the death of Henry V and the succession of his son, Henry VI, who was but a boy, the French, with the aid of Joan of Arc, defeated the English and obliged them to relinquish their claims on France (See JOAN OF ARC).

In the reign of Henry VI (1422-1461) began the long factional struggle known as the Wars of the Roses (See ROSES, WARS OF THE). In the course of these wars Henry VI was several times dethroned and again restored, but ultimately Edward IV, the head of the House of York, firmly established his hold on the throne. After the short reign of Edward V, which was a reign in form only, Richard III usurped the power, but he was overthrown in 1485 at the Battle of Bosworth, and Henry, earl of Richmond, came to the throne as Henry VII. The new king was a man of ability, and he successfully upheld the royal authority, at the expense of Parliament and the nobles, so that his son, Henry VIII (1509-1547), found himself, at his accession, in the possession of great power.

The reign of Henry VIII was chiefly noteworthy for the beginnings of the Reformation

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in England (See REFORMATION; HENRY VIII), which arose not through any desire of Henry's to found a new ecclesiastical system, but from a contest of the king with the pope on a personal matter. Edward VI (1547-1553), Henry's son, carried on the work of the Reformation, but on the accession of Henry's daughter Mary (1553-1558) the most strenuous efforts were made to restore the Catholic religion. Cranmer, Ridley and Latimer were the most illustrious of the many victims of this attempt to crush out the Reformation in England (See MARY I). Mary's efforts, however, were in the end vain, as her half-sister, Elizabeth (1558-1603), on her accession reestablished the reforms which her father had instituted, and by the Act of Supremacy had herself proclaimed head of the Church in England. One important result of this move of Elizabeth's was the increase in the feeling of nationality in England, and this growth was also promoted by the defeat of the Armada (See ARMADA). During Elizabeth's reign Ireland was entirely reduced to dependence on England. (For other important events of this reign, see ELIZABETH; MARY STUART.)

When Elizabeth died, James VI of Scotland, son of Mary Queen of Scots, succeeded her on the throne as James I, but despite this union of the crowns of the two countries, a complete union was not accomplished for over one hundred years. At the outset of his reign, James, by his statement of the doctrine of the "divine right of kings," instituted the controversy with Parliament which ended so disastrously for his son (See JAMES I). This reign is noteworthy in the history of America, because during it were founded the colonies in Virginia and in Massachusetts.

Almost immediately after the accession of Charles I (1625-1649), the struggle with Parliament reached a crisis. Charles prorogued his first two Parliaments, and although he was compelled by the Parliament which convened in 1628 to assent to the Petition of Right (See PETITION OF RIGHT), he assembled no Parliament for eleven years after that time and ruled almost as arbitrarily as Louis XIV of France (See CHARLES I). The persecutions of the Puritans, the attempt to force the Anglican liturgy on the Scottish church and the continued disregard of the necessity of calling a Parliament finally brought matters to a head, and when, in 1640, Charles did assemble a Parliament, because he found that he must have its aid in putting down the risings in Scotland,

Parliament took matters into its own hands and impeached the king's ministers. The contest soon led to open war. After several years of varying fortunes the war ended in the defeat of Charles, who gave himself up to the Scottish army. He was handed over to the English Parliament and in 1649 was tried, convicted of treason and put to death. The strongest man in Parliament and in the army, Oliver Cromwell, soon showed himself the natural head of the country, and he was able by 1653 to make himself lord protector of the commonwealth and to rule almost absolutely until his death in 1658. Cromwell's son proved but a weak successor, and by 1660 the royalists were able to bring about the restoration of Charles II, who was most enthusiastically greeted on his return to England (See CHARLES II). This reign (1660-1685), during which in its foreign policy England was little more than a dependency of France, during which the court and society were more licentious than at any other period of English history, passed without any serious protests against the arbitrary character of Charles, so glad were the people to have again a king of the royal line.

Before the death of Charles, attempts were made to exclude from the succession his brother, James, because he had adopted the Catholic religion, but these proved unsuccessful, and James succeeded to the throne without a struggle. The pronounced favor which he showed to Catholics, his setting aside of the Test Act, his proclamation of a declaration of indulgence and, finally, the birth, in 1688, of a son who, it was feared, might be trained in the Catholic religion and might continue his father's policy, led many of the great nobles of the country to dispatch an invitation to William and Mary, the son-in-law and daughter of James, to accept the English throne. On their landing, late in 1688, James fled, and William and Mary were proclaimed sovereigns without striking a blow (See JAMES II; WILLIAM III).

During William's reign the Dissenters were allowed freedom of worship, and a step was taken in the direction of true constitutional government, by the declaration of the responsibility of the king's ministers to Parliament. In foreign affairs the reign was taken up largely with the struggle with Louis XIV of France, and William died just when he had begun preparations for another struggle with Louis. Anne (1702-1714) continued his plans, and her reign was made brilliant by the successes of

Marlborough in the War of the Spanish Succession (See ANNE; MARLBOROUGH; SUCCESSION WARS, subhead *War of the Spanish Succession*). It was during this reign, in the year 1707, that the legislative union of England with Scotland was finally accomplished. For the further history, see GREAT BRITAIN, subhead *History*. Consult Burroughs's *Fresh Fields*; Knox's *Boy Travellers in Great Britain and Ireland*, and Butterworth's *Zigzag Journeys in the British Isles*.

England, CHURCH OF, the name of the State Church of England. The term is used in two senses. The first in a general way refers to the church as a whole, which since the introduction of Christianity has been the church of the English people. In a broader sense, it refers to the Church of England as distinguished from the Roman Catholic Church, and it is in this sense that the term is ordinarily used. The present Church of England really dates from the reign of Henry VIII, who, by divorcing Catharine of Aragon without the consent of the pope, brought on the struggle which resulted in the abolition of papal authority in England and the complete independence of the Church of that country. Henry was made the supreme head of the Church and at the time contemplated no change in doctrines and no separation into rival communities. However, the king dissolved the monasteries and expended the treasures of the Church on himself and court. These high-handed measures retarded any reform movement that might have been made and caused a general discontent, not only among the officials but among the communicants of the Church. During the reign of Edward VI the influence of the Reformation was strongly felt in England, and there were many men who sympathized with Luther, Calvin and other leaders of that movement; England probably would have become Protestant at that time had not the king been succeeded by Mary, who was a Catholic. During her reign there was a strong reaction. This struggle continued during the reign of Elizabeth, though she exerted her influence for the ancient Church of the land. In 1562 the convocation and parliament at London subscribed to the Thirty-Nine Articles (See ARTICLES, THE THIRTY-NINE), which have ever since been the authoritative teaching, and with the Book of Common Prayer constitute the orthodox doctrines of the Church of England. During Elizabeth's reign, Puritanism sprang up (See PURITANS) and though strongly opposed by Elizabeth and her successor, James I, continued to spread. In 1580 the

Puritans separated from the Church and formed an independent organization. This led to violent persecution as well as civil oppressions, which in 1653 resulted in the overthrow of the king, and from that time till 1660 the Church of England was practically suspended. However, with the restoration of the monarchy and the accession of Charles II, the Church was restored to its original position, from which it has never since been removed, though at different times its influence has been weak and its condition somewhat perilous.

The Church is now divided into two branches, generally known as the *high church* and *low church*. The high church claims to be the representative of the Catholic, or national, school, which was prominent in Elizabeth's time. They believe in the efficacy of the sacrament, in apostolic succession and in the authority of the Church and priesthood (See APOSTOLIC SUCCESSION). The low church represents the Protestant, or Puritan, part of the Church during Elizabeth's reign. They do not believe in the efficacy of the sacrament and deny that regeneration necessarily takes place in infant baptism.

The ecclesiastical law of England is very simple. There is no formal constitution, but the Church is governed by about 150 canons. Parliament with the sovereign may impose any law on the Church. Convocations are called for the purpose of considering ecclesiastical subjects. The country is divided into two provinces, Canterbury and York, with an archbishop in each, the archbishop of Canterbury being the primate of all England. Each province is divided into dioceses, over which are bishops. Next to the bishops in order of rank are the archdeacons and deans, followed by canons, prebendaries, rectors, vicars and curates. Many of the churches have large endowments, and the support of their clergy is entirely independent of the congregation. The Church maintains effective missionary societies and other auxiliary organizations and has missions in almost every part of the world where Christianity does not prevail. See EPISCOPAL CHURCH.

Englewood, *in'g'l wood*, N. J., a city in Bergen co., about 14 mi. n. by e. of Jersey City, on the Erie railroad. It is a residence place near the Hudson River, on the western slopes of the Palisades. There are summer homes for working girls, a hospital and a library association, but no manufactures. The village was incorporated in 1860, and the city was chartered in 1896. Population in 1910, 9924.

Eng'lish, WILLIAM HAYDEN (1822-1896), an American politician, born at Lexington, Ind. In 1843 he became clerk of the lower house of the Indiana legislature. From 1853 to 1861 he was a democratic member of the national House of Representatives, and for the same time he was a regent of the Smithsonian Institution. In 1880 he was unanimously nominated for vice-president by the Democratic convention.

English Channel, the arm of sea which separates England from France, extending, on the English side, from Dover to the Land's End, and on the French, from Calais to the Island of Ushant. It is 20 miles wide at its narrowest point and 140 miles at its widest point. The Seine is the only important river that flows into it. In this channel are the Isle of Wight and the group of the Channel Islands. The chief ports are Plymouth, Falmouth, Southampton, Portsmouth, Brighton and Dover, in England, and Cherbourg, Havre, Dieppe, Boulogne and Calais, in France.

English Language, the language spoken by the people dwelling in England and the United States and in their possessions and colonies. The foundation of this language is the speech of the ancient Angles and Saxons, who separated themselves from their Teutonic brothers in the north of Europe and crossed to England in the fifth and sixth centuries A. D. They found here the Britons, speaking a Celtic dialect; and though, after one hundred fifty years of hard and incessant fighting, they succeeded in driving the natives to the north and west, that ancient language has persisted to this day among the Welsh, and our own language owes to it a number of words. The highly inflected Anglo-Saxon language was little modified until the Norman Conquest, when the proud conquerors made French the language of the court and of law. The English people would not accept this new speech, and for two hundred years two languages with many dialects were spoken in this little island. About 1250 there began the amalgamation of these two tongues, together with the dropping of the complicated inflections. In less than two hundred years this new language had come into the schools and could be heard in the pleadings at law; our modern English language had been pretty well established. Of this new composite language, the Anglo-Saxon had furnished the common words of the home, the farm and every-day life; while the Norman had introduced the words that pertained to the court, society, sports and law. Under the

Italian influence, which lasted from 1400 to 1660, many more words of Latin origin were incorporated into our speech; and the recent developments in science have brought a large influx of technical terms, generally derived from the Latin and the Greek. So in thirteen or fourteen centuries an Anglo-Saxon vocabulary of possibly 30,000 words has expanded into the rich and full English language of over 200,000 words, of which a large majority have been adopted from foreign tongues. Yet the grammar of our language and the vocabulary of our common speech are in the main still the vigorous Anglo-Saxon. See **PHILOLOGY**; **LITERATURE**, subhead *English Literature*; **GRAMMAR**; **LANGUAGE**, **METHODS OF TEACHING**.

English Literature. See **LITERATURE**, subhead *English Literature*.

English Universities. See **UNIVERSITY**, subhead *English Universities*.

Engraving, the art of cutting characters or figures of any sort on wood, stone or metals. Undoubtedly the earliest uses of engraving were for ornament. From this the process of printing from engraved blocks was discovered. The earliest engraving for the purpose of printing consisted in cutting the figures in relief upon blocks of wood, and this art originated with the Chinese, who, as early as the tenth century, were engaged in printing from wooden blocks. The art of printing from engraved plates of metal was discovered by an Italian in the fifteenth century, and by the middle of that century it was quite common in most of the countries of Europe. Some of the most celebrated artists of the fifteenth and sixteenth centuries were engaged in the reproduction of their works by the use of engraved plates. In the latter part of the seventeenth century the art was introduced into England, and from that country it extended to the American colonies.

Previous to the discovery of the art of photography, engraving was about the only means of reproducing portraits or the works of artists; but except for special purposes, such as the printing of bank notes and some very high classes of pictures, the art has now been almost entirely superseded by halftone printing and zinc etching. See **HALFTONE**; **ZINC ETCHING**.

LINE ENGRAVING, as implied by the term, is executed entirely in lines. The tools are few and simple. They consist of the graver, or *burin*, the point, the scraper and the burnisher; an oil stone or hone, dividers, a parallel square, a magnifying lens; a bridge on which to rest the hand;

a blind or shade of tissue paper, to make the light fall equally on the plate, callipers for leveling important erasures, a small steel anvil, a small pointed hammer and punches. In etching, the following articles are required: a resinous mixture, called etching ground, capable, when spread very thinly over the plate, of resisting the action of the acids used; a dauber, for laying the ground equally; a hand vice; some hair pencils of different sizes, and bordering wax, made of burgundy-pitch, beeswax and a little oil.

In engraving, the plate, which is highly polished and must be free from all scratches, is first prepared by spreading over it a thin layer of *ground*. The surface is then smoked, and the outline of the picture is transferred to it by pressure from the paper on which it has been drawn in fine outlines by a black lead pencil. The picture is then drawn on the ground with the etching needle, which removes the ground in every form produced by it and leaves the bright metal exposed. A bank of wax is then put round the plate, and dilute acid is poured on it. This eats out the metal along the lines from which the ground has been removed, but leaves the rest of the plate untouched. The plate is then gone over with the graver, the etched lines are clearly defined, broken lines are connected, new lines are added and other necessary corrections are made. Sometimes the plate is *rebitten* more than once, those parts which are sufficiently bitten in the first treatment being *stopped* with varnish, and only the selected parts exposed to after-biting. Finally, the burnisher is brought into play alternately with the graver and point, to give perfectness and finish. Such is the process for landscape engraving. In historical and portrait engraving of the highest class, the lines are first drawn on the metal with a fine point and are then cut in by the graver, the artist first making a fine line and afterward entering and re-entering till the desired width and depth of lines is attained. Much of the excellence of such engravings depends on the mode in which the lines are laid, their relative thickness and the manner in which they cross one another.

SOFT-GROUND ETCHING. The ground, made by mixing lard with common etching ground, is laid on the plate and smoked as before, but its extreme softness renders it liable to injury. The outline of the subject is drawn on a piece of rough paper larger than the plate. The paper is then damped, and laid gently over the ground, face upward, and the margins are folded over

and pasted down on the back of the plate. When the paper is dry and tightly stretched the bridge is laid across, and with a hard pencil and firm pressure the drawing is completed in the usual manner. The pressure makes the ground adhere to the back of the paper at all parts touched by the pencil, and on the paper being lifted off, these parts of the ground are lifted with it, and the corresponding parts of the plate thus left bare are exposed to the subsequent action of the acid. The granulated surface of the paper, causing similar granulations in the touches on the ground, gives the character of a chalk drawing. The biting-in is effected in the same manner as already described, and the subject is finished by rebiting and dotting with the graver.

WOOD ENGRAVING. Wood engravings are made on Turkish boxwood. The wood is cut across the grain, one side of the slab is polished and finished, and wherever there are imperfections in the wood a hole is bored and a plug of wood is neatly inlaid. A block of the required size is sawed from the slab and prepared for the artist. If the artist is to draw the design or picture to be engraved on the block, the engraver scours the face of the block with pumice stone and a little water. When the wood is bright enough, the water is dried off, and a little flake white is rubbed over the surface. This gives a drawing surface. The artist then sketches the design and turns the block over to the engraver. However, the object which is to be reproduced by the wood engraver is usually photographed on the face of the block. A reverse negative is obtained, and the face of the wood is coated with gelatin and treated with a mixture of zinc white and acids. The surface is then sensitized with nitrate of silver in a "dark room." The negative is clamped to the block, film side next to the wood, and a photographic print is made in the usual manner. See HALFTONE.

The wood engraver's tools are delicate and are made of the finest steel. They are called gravers. These include tint tools, which are used for cutting mechanical or perfectly straight parallel lines; lozenge tools, used for cutting artistic or curved lines; elliptical tools and gouges. If a slip of the knife is made, a hole is bored in the block where the tool slipped, and a plug of wood is inserted. Before the engraver begins cutting out the design, he gums a piece of paper over the sketch or photograph and tears out a hole over that part of the work where he begins engraving. The paper keeps the hand

and fingers from smudging the drawing, and as the work progresses he enlarges the hole. After the job is finished a proof is taken under a hand press, and if it is satisfactory the woodcut is sent to the electrotyper, as the printing is not done from the woodcut, but from electrotypes of it. See AQUATINT; ETCHING; MEZZOTINT.

E'nid, OKLA., the county-seat of Garfield co., 60 mi. n. w. of Guthrie, on the Denver, Enid & Gulf railroad and on several lines each of the Frisco and the Chicago, Rock Island & Pacific systems. The city is located in a fertile farming country, especially productive of wheat. There are excellent shipping facilities, and the many wholesale houses conduct an extensive trade. There are large flour mills, railroad shops, a brick plant, and broom, ice, yeast, artificial stone, candy and other factories. The courthouse is a fine structure, while the hotels and business blocks are mostly substantial brick buildings. The Oklahoma Christian University is here. The city dates from the opening of the Cherokee strip in 1893, and has grown rapidly. Population in 1910, 13,799.

En'nius, QUINTUS (239-169 B. C.), an early Latin poet, considered by the Romans as the father of their literature. Only fragments of his work remain, but these show that he must have been a writer of much vigor and energy.

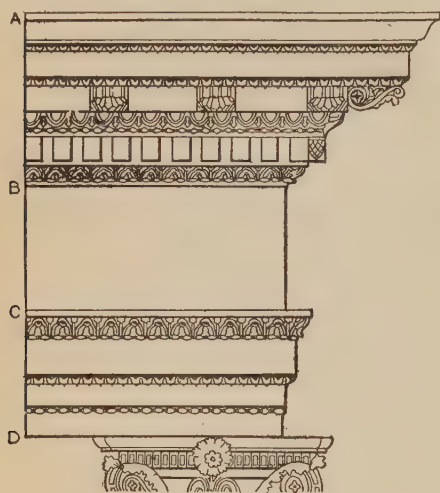
Enoch, *e'nok*, Book or, an apocryphal book of an assumedly prophetic character. Considerable importance has been attached to it on account of the supposed quotation from it by Saint Jude in the fourteenth and fifteenth verses of his epistle. It is referred to by many of the early fathers. Its date and authorship are uncertain.

Ensilage, *en'si layj*, a food or fodder for stock. Any forage plant, usually corn that has grown so near to maturity that it is glazed, is cut, chopped up and packed into a pit, or silo, where by the exclusion of the air it is kept green and nutritious. Silos of the best form are circular and partially underground, built of stone or grout and so constructed that they can be closed air-tight. In this form the silo is emptied from the top or side. Ensilage was introduced into the United States from France about 1875 and now is used to a greater extent here than in Europe. It is of great value on dairy farms, as it furnishes a sweet, juicy fodder during the winter.

Entab'lature, in architecture, the top of a structure; also the part immediately below the roof. Strictly speaking, the term is used in classic architecture to denote the horizontal por-

Entail

tion of a building which rests upon a row of columns. It consists of three principal divisions, the *architrave*, the portion immediately above the column; the *frieze*, the central space, and the



ENTABLATURE

AB, cornice; BC, frieze; CD, architrave.

cornice, the upper projecting moldings. In large buildings, projections similar to and known also as entablatures are often carried round the whole edifice, or along one front of it. See COLUMN.

Entail', in law, the settlement of an estate by which the title to land descends to a person and the heirs of his body, either to all or to special ones, in exclusion of others, with such particular restrictions as the donor may specify. Such a grant forbids the alienation, or sale, of the land, and it thus establishes an hereditary property. Entail has been abolished in most states of the Union. See PRIMOGENITURE.

Entomol'ogy, a branch of zoölogy which treats of insects. See INSECTS.

En'velope, the paper cover that encloses a letter or note. Envelopes became common shortly after the introduction of the railroad postal system. At first envelopes were made by hand, but now the work is done wholly by machines, which cut the envelope from the roll of paper, fold and paste it and apply the mucilage to the flap. Some of these machines will manufacture 55,000 envelopes in a day.

Envi'ronment, a general term used to indicate all the external conditions which affect the life and activity of an individual. It thus includes everything outside of self and is often-times used in distinction to the term *heredity*, or the influence which descends from parent to

Epact

offspring. The environment of an individual is of two kinds, physical and social. The first includes the natural conditions of climate; topography; physical laws, such as gravity and those which produce light, darkness and sound, and the nature and extent of food supply. In the early stages of racial development physical environment is nearly all-important, and in view of this fact a certain group of scholars have emphasized the influence of natural economic conditions upon history, to the extent of declaring that this force is the most important of all influences upon the development of a race or nation. In advanced stages of civilization the social environment attains greater importance. By the use of the materials and conditions that nature throws about every race, customs, ideals and institutions are gradually developed, which soon become a determining influence in the life of the individuals of that race. Such are the institutions of family and State, customs and ideals of religion and industry. See HEREDITY.

Eocene, *e'o seen*, **Epoch**, a division of geologic time, applied to the first part of the Tertiary period. In the United States the formations of this period extend along the Atlantic coast and the Gulf of Mexico, up the Mississippi valley and north of the Ohio. They also occur in some of the ranges of the Rocky Mountains. The rocks include sands, marls, clays, sandstone and limestone. See TERTIARY PERIOD.

E'pact, a number assigned to each year, to assist in fixing the dates of the movable church festivals. The epact for any year corresponds to the number of days elapsing between the date of the last new moon of the previous year and the first of January of the year whose epact is sought. The dates of the succeeding new moons are found by adding 29 and 30 alternately, but these dates often differ considerably from those of the actual or astronomical new moons. Having determined the "golden number" (See METONIC CYCLE) of any year between 1900 and 2199, the epact may be easily found in the following table:

GOLDEN NUMBER	EPACT	GOLDEN NUMBER	EPACT
1	29	11	19
2	10	12	30
3	21	13	11
4	2	14	22
5	13	15	3
6	24	16	14
7	5	17	25
8	16	18	6
9	27	19	17
10	8		

For the years between 1700 and 1899 the epacts for each golden number except 12 were one more than the number given in the table above; for the golden number 12, the epact was 1. See METONIC CYCLE.

Epam'inon'das (418?-362 B. C.), Greek general and statesman, who, for a short time, raised his country, Thebes, to the summit of power and prosperity. He took the leading part in the struggle during which Spartan supremacy in Greece was destroyed and the supremacy of Thebes temporarily secured. Four times he successfully invaded the Peloponnesus at the head of the Thebans.

Ephemera, *e jem'e ra*. See MAY FLY.

Ephesus, *ef'e sus*, an ancient Greek city of Lydia, in Asia Minor, one of the twelve Ionian cities, on the south side of the Cayster, near its mouth. It was at one time the emporium of western Asia, having a convenient and spacious harbor. During the time of the Roman emperors it was especially prosperous. Some interesting remains of ancient times have recently been discovered by excavation, including those of a magnificent theater, a stadium and a temple of Diana (See DIANA, TEMPLE OF). Several church councils were held here. The site of the city is now desolate; near it is a poor village, Aiasoluk.

Ephraim, *ef'ra im*, the younger son of Joseph, the founder of one of the twelve tribes of Israel.

Epic, a narrative poem. Some authorities restrict the term to narrative poems written in a lofty style and describing the exploits of heroes. Others widen the definition so as to include not only long narrative poems of romantic or supernatural adventure, but also those of a historical, legendary, mock-heroic or humorous character. The epic is distinguished from the drama by the fact that in the epic the author frequently speaks in his own person as narrator; and it is distinguished from lyrical poetry by the predominance of action rather than emotion. Among the more famous epics of the world's literature may be noted Homer's *Iliad* and *Odyssey*, Vergil's *Aeneid*, the German *Nibelungenlied*, the Anglo-Saxon poem of *Beowulf*, the French *Song of Roland*, Dante's *Divina Commedia*, Tasso's *Gerusalemme Liberata*, Ariosto's *Orlando Furioso*, Milton's *Paradise Lost*, Spenser's *Faerie Queene*, Camoëns's *Lusiad* (Portuguese) and Firdausi's *Shah Namah* (Persian). Hesiod's *Theogony*, the poetic *Edda*, the Finnish *Kalevala* and the Indian *Mahabharata* may be described as collections of epic legend; and specimens of the mock-

heroic and humorous epic are found in *The Battle of the Frogs and Mice*, *Reynard the Fox*, Butler's *Hudibras* and Pope's *Rape of the Lock*.

Epictetus (60-94), a Greek Stoic philosopher, born in Phrygia. He lived long at Rome, where in his youth he was a slave. Though nominally a Stoic, he was not interested in Stoicism as an intellectual system; he adopted its terminology and its moral doctrines, but in his discourses he appeared rather as a moral and religious teacher than as a philosopher. See STOICISM.

Epicure'anism, a system of philosophy that originated in the latter part of the fourth century B. C. It was founded upon the principle that pleasure is the highest good. Those wishes which can be fulfilled with the least effort or pain were thought to bring the most pleasure; hence the desire for mental enjoyment was to be satisfied, but the cravings for sensuous pleasures which do not lead to a calm mental state were not to be too freely indulged. The Epicureans valued knowledge only as it increased personal enjoyment. They believed that the soul and body died together and had no fears of death, since, while the individual was alive, death was absent, and when death came, the individual was no more. They were bound by allegiance to no particular state or society, but believed in the absolute independence of the individual. The doctrines of Epicureanism were spread throughout Greece and were accepted by many of the prominent Romans. In modern usage the term *Epicurean* is applied to one who seeks pleasure for its own sake.

Epicurus (342-270 B. C.), a Greek philosopher, founder of the Epicurean school, was born in the island of Samos. He settled at Athens, where he established his school and remained during his life. For his system, see EPICUREANISM.

Epicycle. The old Greek astronomers thought that all the heavenly bodies moved about the earth in circles, while the latter body remained stationary. Soon they discovered that this could not be true of the planets, and to account for the apparent differences they assumed that each planet moved in a small circle of its own, and that the center of this circle moved about the earth. This small circle, the orbit of the planet, was known as the epicycle, and the path through which the center of the epicycle passed was called the *deferent*.

Epidemic, a term applied to certain diseases which appear at intervals in various parts of the

world and affect a large number of people. All of these diseases have their source in minute bacteria, which are born and developed in decaying animal and vegetable matter or in stagnant pools. The best preventive of these diseases is complete drainage and perfect sanitation. The paving of streets, building of sewers and the filtration of drinking water all are certain preventive measures. The development of serum therapy has already made possible the prevention of many of these diseases, such as smallpox and diphtheria, and it promises to find preventives for most, if not all, of the others.

Epigaea, *epi je'ah*, the name of the may-flower of the United States. See ARBUTUS.

Epigram, according to the modern meaning of the word, a short poem which, preferably at the end, gives a witty or ingenious turn to the thought. The name is also applied to any concise expression of a general fact. Among the Romans, Catullus and Martial were famous for their epigrams. In English literature, during the Age of Elizabeth, almost every writer of note wrote epigrams, and in a later period Pope especially excelled in this style of writing.

Epilepsy or **Falling Sickness**, a disease of the nervous system, causing unconsciousness, either with or without convulsions. While epilepsy has been known for centuries, it is only within recent years that it has been scientifically studied. The location of the disease is generally considered to be in the gray matter of the brain. It has been cured in rare instances, but usually tends to a general impairment of the mental powers. However, many epileptics live long and useful lives, and the seizures do not increase in frequency and severity as the patient grows older.

There are many varieties of the disease, in some of which there are few outward signs of the attack, and the patient may not know that he has been unconscious. In the ordinary epileptic fit, the person after little or no warning becomes suddenly unconscious and falls, foaming at the mouth. He may have violent convulsions, in which case he should be prevented from doing himself harm in any way. The seizures are often very alarming in appearance, but there is little or no danger, and they will pass away in from ten to twenty minutes, leaving the patient weak for some time. Nothing need be done except to loosen the neckbands and clothing about the chest, to lay the person

down and slightly raise his head. Attempts to force consciousness to return are useless and may be injurious.

Epiphany, *e pi'fa ny*, a festival, otherwise called the *manifestation of Christ to the Gentiles*, observed on January 6 in honor of the adoration of Jesus Christ by the three magi, or wise men, who, led by the star, came to adore him and bring him presents. As a separate festival it dates from 813.

Epiphytes, *ep'i fites*. See AIR PLANTS.

Epirus, a country of ancient Greece, situated in the northwestern part and corresponding to the southern portion of modern Albania. The most interesting locality in it was Dodona. The inhabitants were only in part Greeks. The most celebrated king of Epirus was Pyrrhus, who made war upon the Romans. Epirus became a Roman province in 168 B. C.

Episcopal Church or **Protestant Episcopal Church**, that branch of the Church in America which became independent of the Church of England in 1789, by adopting a constitution of its own. The prayer book adopted was nearly like the one of the English Church (See ENGLAND, CHURCH OF). Previous to 1811 the church made but little progress. However, during the next ten years such advancement was made that there were churches in thirteen states. Following 1835 churches were established in Minnesota, Iowa, Indiana and Missouri. A division of the church occurred later, owing to difference of opinion concerning the ritual, one branch opposing its outward forms, because they felt that they bore too close a resemblance to the Roman Catholic Church, while the other branch held to the original forms. Those opposing the ritual are known as the *low church* faction, while those advocating it are known as the *high church* party. The latter is now the dominant element in the United States. The church maintains a general conference, which meets every three years and is composed of the house of bishops, including all the bishops having jurisdiction in the United States, and the house of clerical and lay deputies, composed of four clergymen and four laymen from each diocese. Changes in the prayer book or constitution of the church can be made only by this body, and then, only when such changes have been published in every diocese for a period of three years previous to the bringing of the question before the general conference for final action. The church maintains sisterhoods and deaconess orders and has

a powerful auxiliary in the Brotherhood of Saint Andrew.

Epitaph, an inscription on a tomb or monument in memory of the dead. Epitaphs were in use among the Greeks and Romans, but the Greeks distinguished by epitaphs only their illustrious men, while among the Romans, private names were regularly recorded upon tombstones. The same practice has generally prevailed in Christian countries. Many so-called epitaphs, modern as well as ancient, are merely epigrams or witticisms, not intended to be used upon monuments.

Epithalamium, the name given by the Greeks to a marriage song, usually sung before the chamber of a newly married couple. Among the Greeks Sappho, Anacreon and Pindar produced famous epithalamia, and among the Romans Catullus wrote several which are extant. The poem written by Edmund Spenser on his marriage to Elizabeth Boyle is accounted the finest of English epithalamia.

Epithelium, in anatomy, the cellular layer which lines the internal cavities and canals of the body, both closed and open, as the mouth, nose, respiratory organs and blood vessels. The term is also applied to the cells of the epidermis, nails and hair and to those that help form glands. There are several varieties of epithelium. See *CILIA*.

Epizooty, *ep'e zo'o ty*, a general name for an infectious disease appearing in short epidemics. In common use, the name is applied to a species of influenza. See *INFLUENZA*.

Epoch or **E'ra**, a fixed point of time, commonly selected on account of some remarkable event by which it has been distinguished, and which is made the beginning or determining point of a particular year from which all other years, whether preceding or ensuing, are computed. The creation and the birth of Christ are the most important of the historical epochs. The creation has formed the foundation of various chronologies, the chief of which are 1, The epoch adopted by Bossuet, Ussher and other Catholic and Protestant divines, which places the creation in 4004 B. C.; 2, The *Era of Constantinople* (adopted by Russia), which places the creation at 5508 B. C.; 3, The *Era of Antioch*, used till 284 A. D., placed the creation at 5502 B. C.; 4, The *Era of Alexandria* placed it at 5492 B. C. This is also the *Abyssinian Era*; 5, The *Jewish Era*, which places the creation in 3760 B. C. The Greeks computed their time by periods of four years, called

Olympiads, from the occurrence every fourth year of the Olympic games. The first Olympiad, being the year in which Coroebus was victor in the Olympic games, was in the year 776 B. C. The Romans dated from the supposed era of the foundation of their city, April 21 in the third year of the sixth Olympiad, or 753 B. C. The *Christian Era*, or mode of computing from the birth of Christ as a starting-point, was first introduced in the sixth century and was generally adopted by the year 1000. This event is believed to have taken place earlier, perhaps by four years, than the accepted date. The Julian epoch, based on the coincidence of the solar, lunar and indictional periods, is fixed at 4713 B. C. and is the only epoch established on an astronomical basis. The *Mohammedan Era*, or *Hegira*, begins on July 16, 622, and the years are computed by lunar months. The Chinese reckon their time by cycles of 60 years.

Ep'som Salts, sulphate of magnesium appearing in capillary fibers or needle-shaped crystals. It is found native in some mineral springs, but is usually manufactured from magnesian limestone. It is used as a purgative and in the arts. It takes its name from Epsom, England, where it was first procured from mineral waters.

Ep'worth League, a religious organization of the young people of the Methodist Episcopal church, organized in 1889. The society now numbers over 14,000 senior and 7,500 junior chapters and has a membership of more than 600,000, the largest denominational society of young people in the world. The *Epworth Herald*, the official organ, had in 1913 a paid circulation of 100,000.

Equa'tor, that great imaginary circle of our globe, every point of which is 90° from the poles. All places which are on it have invariably equal days and nights. Our earth is divided by it into the northern and southern hemispheres. From this circle is reckoned the latitude of places both north and south. There is also a corresponding celestial equator, in the plane of the terrestrial, an imaginary great circle in the heavens, the plane of which is perpendicular to the axis of the earth. It is everywhere 90° distant from the celestial poles, which coincide with the extremities of the earth's axis, supposed to be produced to meet the heavens. During its apparent yearly course the sun is twice in the celestial equator and twice vertically over the terrestrial equator, at the beginning of spring and

of autumn. For the magnetic equator, see **ACLINIC LINE**.

Eq'uator'ial, an astronomical instrument contrived for the purpose of directing a telescope upon any celestial object and of keeping the object in view for any length of time, notwithstanding the daily motion of the earth. For these purposes a principal axis, resting on firm supports, is mounted exactly parallel to the axis of the earth's rotation; it consequently points to the poles of the heavens, being fixed so as to turn on pivots at its extremities. To this there is attached a telescope, moving on an axis of its own, in such a way that it may either be exactly parallel to the other axis or at any angle to it; when at right angles it points to the celestial equator. By this means a star can be followed by one motion from its rising to its setting. In some observatories the equatorials have the necessary motion given them by clockwork.

Eques'trian Order, the order of knights in ancient Rome. The *equites*, or knights, originally formed the cavalry of the army. They are said by Livy to have been instituted by Romulus, who selected 300 of them from the three principal tribes. About 123 B. C. the *equites* became a distinct order in the State, and the judges and the farmers of the revenue were selected from their ranks. Toward the end of the Republic they possessed much influence.

E'quinoc'tial, in astronomy, the circle in the heavens otherwise known as the celestial equator. When the sun is on the equator, there is equal length of day and night over all the earth; hence the name *equinoctial*. *Equinoctial gales* are storms which are observed generally to take place about the time of the sun's crossing the equator, that is, at the vernal and autumnal equinoxes, in March and September. *Equinoc'tial points* are the two points wherein the celestial equator and ecliptic intersect each other; the one, being in the first point of Aries, is called the *vernal* point; and the other, in the first point of Libra, the *autumnal* point. These points are found to be moving backward or westward at the rate of 50'' of a degree in a year. See **PRECESSION OF THE EQUINOXES**.

E'quinox, the precise time when the sun enters one of the equinoctial points, or the first point of Aries about the 21st of March, and the first point of Libra about the 22d of September, making the day and night of equal length all over the world. At all other times the lengths of the day and of the night are unequal, their difference being the greater the more we ap-

proach either pole, while in the same latitude the difference is everywhere the same.

Eq'uisse'tum. See **HORSETAIL RUSH**.

Eq'uity, in law, a system of law administered in certain courts, originally founded upon justice, rather than precedent, but now consisting of well defined principles, which are liberally interpreted and developed to meet new exigencies. It aims to assist the defects of the common law by extending relief to those rights of property which the strict law does not recognize, and by giving more ample redress than the ordinary tribunals afford. Courts of equity grant redress to all parties where they have rights, and they modify and fashion that redress according to circumstances. They bring before them all the parties interested in the subject-matter of the suit and adjust the rights of all. See **CHANCERY, COURT OF; LAW; COMMON LAW**.

E'ra of Good Feel'ing, the name applied to the period of Monroe's administrations, between 1817 and 1825, when national political strife seemed absent, the Democrats having a large majority and the Federalist party being almost extinct. However, during this period the issues of tariff, internal improvements and the national bank were arising, and some of the most bitter contests in American history were taking place in Congress.

E'rasis'tratus, an ancient Greek physician, born about 340 or 325 B. C., the first who systematically dissected the human body. His description of the brain and nerves is much more exact than any given by his predecessors.

Eras'mus, **DESIDERIUS** (1467-1536), a celebrated scholar and writer, born in Rotterdam, Holland. He was ordained for the priesthood, but soon entered the University of Paris and spent most of his life in France, England, Holland and Italy. He was seldom connected with any institution of learning, but acted as a private tutor and was for a short time professor of theology and Greek at Cambridge University. He became widely known through his writings and lectures and was regarded as the ablest scholar of his time. He was an intimate associate of Luther, but when the Reformation broke out he sided with neither party.

Erasmus contributed considerably to the importance of education. He divided it into four parts, religious or ethical culture, intellectual culture, material culture and formal culture. By material culture he meant about the same as is now included under manual training. He

believed in private instruction and was opposed to large schools, because of their influence on the health and morals of the pupils. He advocated the education of girls on a plan similar to that for boys; he also declared that rich parents should teach their children some trade.

Erastus, the learned name of Thomas Lieber (1524-1583), a Swiss physician, who maintained the opinions from which the well-known epithet of *Erastian*, as now used, is derived. He was successively professor of medicine at Heidelberg and of ethics at Basel. He maintained in his writings the complete subordination of the ecclesiastical to the secular power; and he declared that the Church had no right to exclude any one from church ordinances or to inflict excommunication.

Erato, in Greek mythology, the Muse who presided over lyric and, especially, amatory poetry.

Erckmann-Chatrian, *erk'man shat tre ahN'*, the joint name of two French-Alsatian writers of fiction. EMILE ERCKMANN (1822-1899) was born at Pfalzburg, and ALEXANDRE CHATRIAN (1826-1890) was born at Soldatenthal, near Pfalzburg. The scenes of most of their stories are laid in the district in which they were both born, which then belonged to France, but which was afterward annexed to Germany. They formed a literary partnership in 1847, but it was not until 1859 that success attended them. In their list of novels the best-known and most popular are *The Conscript*, *Friend Fritz* and *Waterloo*, a sequel to *The Conscript*.

Erebus, in Greek mythology, the son of Chaos and Darkness. The name Erebus was also given to the lower world.

Erebus and Terror, the names of two volcanoes in South Victoria Land. They were both discovered by Sir J. C. Ross in 1841, who named them from two vessels used in his expedition. The former is 12,370 feet high, and the latter, about 30 miles farther east, is 10,900 feet high.

Er'echthe'um, a temple of the Ionic order in Athens, dating from the end of the fifth century B.C. It contained a shrine to Athene, two to Erechtheus (whence the name), the salt spring of Poseidon, the sacred olive of Athene and other sacred memorials. The building is square, with porticoes on three sides. The east portico extends across the front and is adorned with six Ionic columns. On the south side at the west end is the famous Porch of the Caryatides, whose rich entablature rests on the heads of six female

figures a little larger than life, ranking as the finest of architectural sculpture. The frieze was decorated with white marble reliefs, only fragments of which remain to-day.

Erfurt, *er'foort*, an important town in the Prussian province of Saxony, on the Gera, 14 mi. w. of Weimar. It has a fine cathedral, dating from the thirteenth century, and several handsome Gothic churches. The university, founded in 1378 and suppressed in 1816, was long an important institution. There are still a royal academy of science and a royal library with 60,000 volumes. The monastery (now an orphanage) was the residence of Luther from 1501 to 1508. The manufactures are varied, including clothing, machinery, leather, shoes, ironmongery and chemicals. Erfurt was one of the most important commercial towns of central Germany in the Middle Ages. Population in 1910, 111,461.

Ergot, *ur'got*, the altered seed of rye and other grasses, the change being caused by the attack of a fungus. The seed is replaced by a dense close-grained tissue, largely charged with an oily fluid. Ergot is poisonous, but is used as a drug, from its powerful action on the heart.

Eric'sson, JOHN (1803-1889), a famous engineer, born in Sweden. He served for a time in the Swedish army, removed to London in 1826 and later to New York. He is identified with numerous inventions and improvements on steam machinery and its applications. His chief inventions are his caloric engine, the screw propeller, which has revolutionized navigation, and his turret ships, the first of which, the *Monitor*, distinguished itself in the American Civil War and inaugurated a new era in naval warfare. In his later years he attempted to perfect the solar engine. See MONITOR, THE. (See illustration on next page.)

Eric the Red, a Norwegian navigator, who fled to Iceland in 982. While searching for a



ERGOT OF RYE

western land which his countrymen had previously visited, he came upon Greenland. In 985 he returned to Iceland and organized a fleet of twenty vessels for a new voyage. Some of the ships were lost in a storm, but he succeeded in reaching the Greenland coast with fourteen. His colony was not permanent, however.

His son LEIF, twelve years later, is said to have discovered the continent of North America, which he called Markland, or Vinland.

Erie, PA., the county-seat of Erie co., 95 mi. n. e. of Cleveland, Ohio, has the finest harbor on Lake Erie. The city has very great commer-



JOHN ERICSSON

cial interests, as the only lake port of the state; and it is also an important railroad center, being on the Lake Shore & Michigan Southern, the Philadelphia & Erie, the Pennsylvania and other railroads. An abundant supply of natural gas, its proximity to the coal and coke fields and its fine shipping facilities make the city an important manufacturing center. The industries include boiler and engine works, iron works, foundries, machine shops, refineries, chemical works, tanneries, paper mills, flour mills and piano and organ factories. Being the natural market for a rich farming country, the city has considerable trade in agricultural products. On Garrison Hill, opposite the entrance to the harbor, is located the state soldiers' and sailors' home. Other important institutions are the United States Marine Hospital, Hamot Hospital, Saint

Vincent's Hospital and the Protestant Home for the Friendless. Erie has a fine government building, containing the postoffice, the internal revenue and customs offices, the signal service station and the district court rooms. The public library is a part of the public school system and contains over 36,000 volumes. The land-locked harbor is protected by Presque Isle, a peninsula six miles long and a mile wide. A fort of this name was built on the site of the present city in 1753. The settlement was laid out in 1795 and was chartered as a city in 1851. Gen. Anthony Wayne died here in 1796, and the state has erected a memorial in the form of a blockhouse. The fleet of Commodore Perry was built and equipped at Erie, and here that naval officer made his headquarters during the War of 1812. Population in 1900, 52,733; in 1910 it was 66,525.

Erie, LAKE, one of the great chain of North American lakes, between lakes Huron and Ontario. It is about 240 miles long and 40 miles broad and has an average depth of 120 feet. The fall from Lake Erie to Ontario is 326 feet. The whole of its southern shore is within the territory of the United States, and its northern within that of Canada. It receives the waters of the upper lakes by Detroit River, at its western extremity, and discharges its waters into Lake Ontario by the Niagara River, at its northeast end. The Welland Canal enables vessels to pass from it to Lake Ontario (See WELLAND CANAL), and the Erie Canal extends from Buffalo to Albany and connects Lake Erie with the Hudson River (See ERIE CANAL). It is shallow, compared with the other lakes of the series, and is subject to violent storms. Lake Erie washes the shores of Michigan, Ohio, New York and Pennsylvania, which it separates from Ontario, Canada. The principal harbors are Buffalo, Erie, Cleveland, Sandusky and Toledo.

Erie, LAKE, BATTLE OF, an important naval battle of the War of 1812, fought on Lake Erie, September 10, 1813, between a squadron of nine small vessels, under Commodore Perry of the United States navy, and one of six vessels, under Commodore Barclay of the British navy. The *Lawrence* was Commodore Perry's flagship, and for two hours it bore the brunt of a terrible battle. When it was almost a total wreck, Perry left the vessel and crossed in a small row-boat, under the concentrated fire of the British fleet, to the *Niagara*, where he again raised his pennant. Bringing the rest of the American fleet into close action, within ten minutes he

Erie Canal

compelled the British to strike their colors. Then he sent the famous message to the government officials, "We have met the enemy and they are ours." See WAR OF 1812.

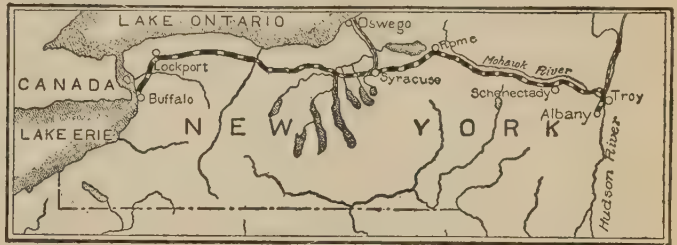
Erie Canal', a canal extending from Buffalo to Troy and Albany, N. Y., and connecting Lake Erie with the Hudson River. The Erie Canal was begun in 1817 and completed in 1825, at a cost of \$7,602,000. It was 363 miles long, 28 feet wide at the bottom, 40 feet wide at the top and 4 feet deep. The canal was carried over several rivers on stone aqueducts.

The construction of the Erie canal was due to the energy and foresight of De Witt Clinton, who was governor of New York during most of the time it was under construction. It was built by the state and is operated free of charge. This canal was the first great public work undertaken in the United States, and its completion was one of the most important events in the economic and commercial history of the country. It virtually connected the Great Lakes with the sea; it reduced the time of freight between Buffalo and Albany from 20 days to 10, and freight charges, from \$100 to \$10 per ton. It was the opening of this canal that gave New York the impetus which led her to become the leading commercial and financial city of America.

It was later enlarged to a width of 70 feet at the surface and 58 feet at the bottom, with an average depth of 7 feet. In 1897-98, about \$9,000,000 were spent on further improvements, and parts of the canal were now 9 feet deep. In 1903 a further expenditure of \$101,000,000 was authorized by the legislature. The enlarged system, together with the tributary Oswego and other canals, is known as the New York State Barge Canal. Construction work was begun in 1907, and several sections were ready for traffic by 1911. The entire system is to be completed in 1914 or 1915. The width of the channel at the bottom varies from 75 to 94 feet and at the surface from 120 to 200 feet; the wider sections are cut through rock. The new canal is 12 feet deep and will accommodate barges 310 feet long, of 2000 to 3000 tons burden. The locks, which are concrete, are 12 feet deep, 45 feet

Ermine

wide and 328 feet long. The Erie Canal proper has 35 locks and is 323 miles long. The Oswego, the Champlain, and the Cayuga and Seneca branches have 22 locks. The barge canal with all its branches has a length of 424 miles. In connection with the canal, two large reservoirs, the Delta and the Hinckley, were constructed on the upper Mohawk. The Delta reservoir with a capacity of nearly 300,000,000 cubic feet is about 3 miles north of Rome. The Hinckley reservoir holds about 3,500,000,000 cubic feet. On the lower Mohawk, near Schenectady, movable dams have been constructed, the first of this type in America. See CANAL.



ERIE CANAL

E'r'is, in Greek mythology, the goddess of discord.

Ermine, *ur'min*, or **Stoat**, *stote*, a species of weasel found over temperate Europe, but most commonly in the north. Like many other species of this genus, the ermine has the faculty of ejecting a fluid of a musky odor. In winter, in cold countries or severe seasons, the



ERMINE IN WINTER DRESS

fur changes from a reddish brown to a yellowish white, or almost pure white, under which shade the animal is recognized as the ermine. In both states the tip of the tail is black. Its fur is short, soft and silky. The best skins are brought from Russia, Sweden, Norway and Northern Canada. It is one of the insignia of royalty and is used on the robes of judges. Much of the fur now sold as ermine is the fur of the white rabbit.

Erosion

Ero'sion, in geology and physiography, the process of wearing away portions of the earth's surface. The principal agents of erosion are rain, running water, waves, ice and the atmosphere. Rain water contains ammonia, carbonic acid and frequently small quantities of muriatic and nitric acids. These substances decompose some of the rocks on which the rain falls. When rain strikes the earth a portion of it soaks into the soil and penetrates to some distance beneath the surface. This water collects in cavities in various strata, and some of it reappears in springs. Another portion runs down the slopes, carrying with it more or less of the soil, dust and particles of decomposed rocks and depositing these on lower levels.



THE GRAND CANYON OF THE COLORADO RIVER
An example of the work done by erosion

The different degrees of hardness at various points on the surface of slopes, as well as their original unevenness, cause the water to flow down them in rills and rivulets. Each of these cuts a channel for itself. Thus the slopes are made still more uneven by running water, and it is in this way that hillsides are sculptured in such a variety of forms. The deep valleys between the plateaus are excavated in the same way (See CANYON). The main stream in a valley also wears away more or less of the valley floor. A large stream like the Mississippi, flowing through a region of loose rock, will form a wide valley with broad, gentle slopes, but wherever the current is swift, the stream may have its channel defined by abrupt banks, which are usually low and contain here and there high bluffs. See VALLEY.

Waves are confined in their action to the

Erzerum

shore line, but along the seacoast, wherever breakers occur, they are continually wearing away the rock. Waves also carry out with the undertow more or less sand and gravel from the beach. Thus the shore line is gradually extending. Similar effects are produced on large bodies of fresh water like Lake Superior, but they are not so distinctly marked nor so extensive.

Ice acts principally by breaking and crumbling rocks through the freezing of water. This so disintegrates the rock that particles of it are easily carried away by water. Wherever glaciers exist, their movement is attended with erosion, as well as transportation of material (See GLACIERS).

The atmosphere works both by mechanical and chemical action. The oxygen, carbon dioxide, water vapor and other substances found in the atmosphere tend to decompose rocks and form new compounds. In the arid regions the wind wears away rocks in certain localities and denudes those in others. Much of the sculpturing in the Rocky Mountain regions is due to this cause.

Errat'ics or **Erratic Blocks**, in geology, boulders, or large masses of angular rock, which have been transported to a distance from their original mountains by the action of ice during the glacial period. Thus, on the slopes of the Jura Mountains immense blocks of granite are found, which have traveled 60 miles from their original location. Similarly, masses are found in numerous places in the United States. See BOULDER.

Er'ysip'elas, a very infectious bacterial disease, which is sometimes an epidemic in hospitals, especially military hospitals in time of war. It is not, however, a purely hospital disease, but affects individuals who have been exposed to the contagion. It usually appears upon the head or face, in the form of an inflammation of the skin, accompanied by swelling and pain, and may terminate in fever and delirium.

Erzerum or **Erzeroum**, *er z'room'*, a city of Turkish Armenia, capital of the province of the same name. The town is about 6000 feet above sea level, forms an important strategical center and has become a principal frontier fortress. In addition to important manufactures, especially in copper and iron, it carries on an extensive trade and is a chief halting place for Persian pilgrims on their way to Mecca. Population, about 40,000.

E'sarhad'don, a king of Assyria. He came to the throne in 680 B. C., on the death of his father, Sennacherib, and his first work was to punish his brothers, who had killed Sennacherib. Besides the war against his brothers, he was engaged in a conflict with the Chaldeans and in an expedition against Egypt, which he reduced to the condition of an Assyrian province.

E'sau, the eldest son of Isaac and twin brother of Jacob. The story of his marriage, of his loss of birthright through the craft of Rebekah and Jacob and of his quarrel and reconciliation with Jacob is told in the book of *Genesis*. He was the progenitor of the Edomites, who dwelt on Mount Seir.

Escanaba, *es'ka naw'ba*, MICH., a city and the county-seat of Delta co., on Little Bay, 121 mi. n. of Green Bay, on the Chicago & Northwestern and other railroads. It has a good harbor and is one of the most important shipping points for the Lake Superior iron region. It was first settled in 1863 by employes of a railway company and became a city in 1883. Population in 1910, 13,194.

Escape'ment, the general contrivance in a timepiece, by which the pressure of the wheels, which move always in one direction, and the vibratory motion of the pendulum or balance-wheel, are accommodated to each other. By this contrivance the wheelwork is made to communicate an impulse to the regulating power, which in a clock is the pendulum and in a watch the balance wheel, so as to restore to it the small portion of force which it loses in every vibration, in consequence of friction and the resistance of the air. The leading requisite of a good escapement is that the impulse communicated to the pendulum or balance wheel shall always be the same, notwithstanding any irregularity in the train of wheels. See CLOCK; WATCH.

Esco'rial or **Escu'rial**, a remarkable building in Spain, near Madrid, comprising a palace, a convent, a monastery, a church and a mausoleum. It was built by Philip II and was dedicated to Saint Lawrence, in commemoration of the victory of Saint Quentin, fought on the festival of the saint in 1557. It is built on the plan of a gridiron, because Saint Lawrence is said to have been broiled alive upon one of these. It was begun in 1563 and was finished in 1584. The church, the finest portion of the whole building, is richly decorated and contains a crypt, or royal tomb, in which are buried all but two of the kings of Spain since Charles V. The dome is 60 feet in diameter, and its height

at the center is about 320 feet. The library contains a valuable collection of some 30,000 books and manuscripts. The principal entrance to the palace is opened but twice during each reign, once to admit the king on his first visit to the place, and a second time when his dead body is carried through. Fire and lightning have frequently damaged the Escorial, but it has repeatedly been repaired, so that it represents to-day an expenditure of \$10,000,000.

Esdraelon, *es dra e'lon*, or **Plain of Jezreel**, a plain extending across Palestine, from the Mediterranean to the Jordan, and drained by the river Kishon. It separates the mountain ranges of Galilee from those of Samaria. It is bounded on the west by Mount Carmel, on the north by the hills of Galilee and on the south-east by Gilboa. In this plain many contests, of both ancient and modern times, have been fought.

Es'dras, BOOKS or, certain books of that portion of the Old Testament known as *Apocrypha*. They are generally divided into the *First Book of Esdras* and the *Second Book of Esdras*. As ordinarily considered, the first book includes the book of *Ezra*, a portion of *Nehemiah* and the last two chapters of *II Chronicles*. The second book consists of the revelation of Esdras and somewhat resembles in its nature the book of *Revelations*. It consists of a series of visions regarding the mysteries of the moral world and the final triumph of righteousness. The descriptions are striking, and the language is sublime. See APOCRYPHA.

Es'kimo, a race inhabiting the Arctic regions. They call themselves *Inu-it*, the people; the name *Eskimo* is from an Algonquin word, signifying *eaters of raw flesh*. They consist of three principal stocks: the Greenlanders; the Eskimo proper, in Labrador, and the Western Eskimo, found along Hudson Bay, the west side of Baffin Bay, the polar shores as far as the mouths of the Coppermine and Mackenzie rivers, and on both the American and Asiatic sides of Bering Strait. By some authorities they are classified with the American Indians, but other scientists consider them more closely akin to the Mongolian race. Their leading physical peculiarities are a stunted stature, flattened nose, projecting cheek bones, eyes often oblique, and yellow and brownish skin. The hair is straight and jet-black in color. Seal skins, reindeer and other furs are used as materials for dress, according to the season, as well as skins of otters, foxes and martens. In summer they live in tents covered with skins; in winter they may be said to burrow

beneath the snow. In Greenland, houses built of stone and cemented with turf are used as permanent habitations. Vegetation being extremely scarce, their food consists of the flesh of whales, seals and walruses, often eaten raw. They show remarkable skill in fishing and hunting with bows and arrows, spears or lances; these generally are pointed with bone, but occasionally with metal, which they obtain in small quantities from the whites. Their only domestic animal is the dog, which they train to draw heavy loads on rude sleds. They make a boat, or *kyak*, from oiled skin and handle it with marvelous skill. In intellect the Eskimos are by no means deficient; in manners they are kind and hospitable. Their religious ideas appear scanty, but success has attended the labors of the Danish missionaries in teaching them the Christian religion.

Eskimo Dog, a breed of dogs found in northern regions of America and eastern Asia. It is larger than the English pointer, but appears smaller on account of the shortness of its legs. It has oblique eyes, an elongated muzzle and a bushy tail, which give it a wolfish appearance. The color is generally a dull brown, patched with darker color. It is the only beast of burden in these latitudes, and with a team of such dogs attached to his sledge the Eskimo will cover sixty miles a day for several successive days.

Esparto, a grass growing in Spain and North Africa, long used in the manufacture of cordage, matting and similar articles, and now extensively employed in paper making.

Esperanto, an artificial language invented by Dr. Zamenhof of Warsaw, who, under the assumed name of *Dr. Esperanto*, published his first pamphlet upon the subject in 1887. From this the language takes its name. Esperanto is claimed to be the best attempt so far to produce an international language. The vocabulary is formed by selecting first the root words which are common to all the principal European languages; second, those that are common to all but one; then those that are common to all but two, and so on. The grammar is regular and very simple. By means of an elaborate system of prefixes and suffixes the vocabulary is extended to an almost unlimited degree; thus, *bona* means good, *malbona*, bad; *fermi* means close, *malfermi*, open. The suffix *in* denotes feminine; *knabo* means boy, *knabino*, girl. Several books have been published in Esperanto. Other languages competing with Esperanto for place as an international language are Volapuk, Idiom, Neutral and Bolak.

Es'say, in literature, a composition which expresses the views and opinions of the author on some one subject and which is in general shorter and less formal than a treatise. At times, however, the name *essay* is given by authors to productions which might more accurately be called treatises. In the history of the essay the most important name is that of Montaigne, who may be accounted the originator of this form of composition. Among English writers, Bacon was most influential in the development of the essay. Among other essay writers in English may be mentioned Steele, Addison, Carlyle, Macaulay, Lamb, Matthew Arnold, Emerson, Lowell, Stevenson and Henry Austin Dobson.

The following list aims to include only those essays of sufficient strength or influence to possess a present power. The list might easily be doubled and still not include many well-known essays of these and other authors. (See articles on authors mentioned above.)

Bacon's *Of Studies*; Steele's *Tatler*; Addison's *Spectator*; Johnson's *Rambler*; Irving's *Salmagundi Papers*; Lamb's *Essays of Elia*; Macaulay's *Milton*; Carlyle's *Sartor Resartus*; Emerson's *Self-Reliance and Conduct of Life*; Holmes's *Breakfast Table Series*; Thoreau's *Walden*; Matthew Arnold's *Literature and Dogma*; Lowell's *Among My Books*; Stevenson's *Virginibus Puerisque*; Ruskin's *Sesame and Lilies* and *Crown of Wild Olives*.

Es'sen, a town of Rhenish Prussia, 18 mi. n. e. of Düsseldorf. It has a fine cathedral dating from 873, one of the oldest churches in Germany. The town has grown recently with great rapidity and is celebrated for the steel and iron works of Krupp, the most extensive in the world, employing about 45,000 workmen. The rifled steel cannon made here are supplied to most of the armies of Europe. Essen is situated in the center of a rich coal region. The town dates from the ninth century. Population in 1910, 294,629.

Essequibo, *es'se ke'bo*, a river of British Guiana, which flows into the Atlantic by an estuary 20 miles in width, after a course of about 450 miles. Its course is tortuous and is full of cataracts. It is navigable for some distance. On the banks are dense forests of locust, ebony and other trees.

Es'sex, THE, a famous vessel of the American navy. Under Captain Porter it was attacked by the British sloop *Alert*, August 13, 1812, but captured its opponent after a single broadside. Late in the same year the *Essex* made a notable

cruise in the Pacific Ocean, capturing fully \$2,500,000 worth of property and hundreds of seamen. However, in February, 1814, the *Essex* was confronted by two British men-of-war, the *Phoebe* and the *Cherub*, while in the port of Valparaiso, South America, and on March 28 was attacked in the open sea by the enemy. After a desperate battle, during which two-thirds of the American crew were killed or disabled, Captain Porter was forced to surrender.

Essex Jun'to, the name given to a group of Revolutionary leaders in Essex County, Mass., who gained fame as advocates of a strong central government. They formed the nucleus of the Federal party and were its most radical adherents during its supremacy. Among the prominent members of the Essex Junto were Fisher Ames, George Cabot and Timothy Pickering.

Estate', the interest which a landholder possesses in his land. The term arises from the fact that under the old feudal system the ownership of all land was vested in the king, and all private holders of land were his tenants. The interest of such a tenant was called his estate, and this was always less than absolute ownership. Thus various classes of tenancies or estates were developed, and these persist in law to the present time. Of these estates three are called freeholds. They are the *fee simple*, that is, the right to dispose of land in any way, which suits the possessor, practically an absolute ownership; the *fee tail*, which gives the possessor the right to dispose of his land only to his own issue, and the *life estate*, which gives the possessor the right to dispose of the land only for the space of his lifetime. The estates which are not freeholds are various forms of tenancies, the difference usually being in the period over which the contract extends, whether for years, for life, from year to year, terminable at the will of either party or at the sufferance of the so-called owner of the land. See **REAL PROPERTY**.

An estate in its political meaning indicates one of several distinct classes or castes in society. Thus, under feudalism, the nobles, the clergy and the commons each constituted a separate estate. The history of the Middle Ages and the early modern period is largely the record of the contest between these three classes singly, in combination or against the Crown. The press was called by Burke the fourth estate.

Esther, *es'tur*, a Jewess who became the queen of Ahasuerus, king of Persia, and whose story is told in the book of the Old Testament

called by her name. Various opinions are held regarding the time and truth of the story, but it is judged by scholars of to-day as a romance, built upon some foundation of truth. The feast of Purim, which commemorates the events narrated, is still observed by the Jews during the month Adair. See **ESTHER**, **BOOK OF**, **THE**.

Esther, **BOOK OF**, **THE**, the last of the historical books of the Old Testament, takes its name from the Jewish maiden whose history it gives. The book is written in Hebrew, with many Persian words, which seems to prove that its date was during the Persian rule in the reign of Artaxerxes, 465-425 B. C. The word *God* does not occur in the text; neither is the book alluded to or quoted in the New Testament, and with the exception of Esther's fast no religious act is spoken of.

Esthetics, that branch of philosophy which deals with the principles of beauty in nature and art. Socrates, Aristotle, Plato and other ancient philosophers recognized the science of the beautiful, but modern systems of esthetics date from the middle of the eighteenth century. At that time the German philosopher Baumgarten advanced a theory that the mind possessed a special power for appreciating the beautiful, and that this power did not depend upon the intellect, though the intellectual power might be necessary to develop the esthetic power.

There are now two schools of esthetics. One considers the great works of art to form the standards of beauty. Starting with these and the most perfect models of nature, this school seeks to create a new work, in which shall be combined as many as possible of the features of the original. The other school considers the most perfect elements of beauty to be found in the works of nature and believes that it is by combining these elements that the greatest works of art, such as the Apollo Belvedere, have been produced. This school considers the ability to select these elements to be due to the esthetic power of the mind, and that it is by this power that one's ideals of the beautiful are formed.

Etch'ing, the process of engraving metal plates by means of an acid. The plate is cleaned and covered with an *etching ground*, which is a composition of Egyptian asphaltum, virgin wax and Burgundian pitch. This protects the surface from the action of the acid. The design is then cut through this coating with steel tools, called *etching needles*, and the plate is placed in a weak solution of nitric acid. The acid eats, or "bites," the design in the plate. The different

degrees of light and shade are produced by etching some portions of the plate more than others. After the lines which require but little etching have been formed, that portion of the plate is again covered with etching ground and the action of the acid on it stopped. Some of the finest works are reproduced by combining etching and engraving in the preparation of the plates. See ENGRAVING; ZINC ETCHING.

Etesian, *e te'zhan*, **Winds**, the name of the north and northeast winds which blow across the Mediterranean during the summer. They are supposed to be caused by the extreme heat over the Desert of Sahara. See WIND.

Ethelbert, (about 552-616), king of Kent, succeeded his father in 560. He reduced all the Anglo-Saxon states except Northumberland to the condition of dependents. Ethelbert married Bertha, a Christian princess, the daughter of the king of Paris, an event which led indirectly to the introduction of Christianity into England by Saint Augustine.

Ethelbert, (?-866), king of England, son of Ethelwulf, succeeded to the government of the eastern side of the kingdom in 855, and five years later, on the death of his brother, he became sole king. The Danes troubled the country during his reign.

Ethelred I (?-871), king of England, son of Ethelwulf, succeeded his brother Ethelbert in 866. The Northmen became so formidable in his reign as to threaten the conquest of the whole kingdom.

Ethelred II, surnamed *the Unready* (968-1016), king of England, son of Edgar, succeeded to the throne in 978. From the beginning of his reign he had trouble with the Danes. After repeated payments of tribute, he ordered, in 1002, a massacre of the Danes; but in revenge Sweyn gathered a large force and spread desolation through the country. The Danes were again bribed to depart; but upon a new invasion Sweyn obliged the nobles to swear allegiance to him as king of England, while Ethelred fled to Normandy. On the death of Sweyn he was invited to resume the government and died at London in the midst of his struggle with Canute.

Ethelwulf, (?-858), king of Wessex and Kent, succeeded his father Egbert about 839. His reign was in great measure occupied in repelling Danish incursions. When, on his return, in 856, from a journey to Rome, he found that his son Ethelbald had usurped his throne, he made no attempt to regain his power. Alfred the Great was a son of Ethelwulf,

E'ther, an extremely rare medium, without weight or color, but possessing great elasticity and supposed to extend throughout all space. Scientists suppose ether to be the medium which transmits light and heat from the heavenly bodies. See HEAT; LIGHT.

Ether, also called *sulphuric ether*, a very light, volatile liquid, which burns easily and has a pleasant, sweetish smell. It is used to make persons insensible to pain, when they are to have an operation performed. It is also used as a medicine, when placed under the skin, and to dissolve fats, resins and some other substances.

Eth'ics (also called Moral Philosophy) is the science which treats of the nature and laws of the actions of men, considered as to whether they are right or wrong, good or bad. The science is more or less closely connected with theology, psychology, politics, political economy and jurisprudence, but what most strictly belongs to it is the investigation of the principles and basis of duty, or the moral law, and an inquiry into the nature and origin of the mental powers by which duty is recognized. Various answers have been given to the question why we call an action good or bad. It is said that it is to be answered by determining whether it is consistent or not with the will of God, or with the nature of things, or with the greatest happiness of the greatest number, or whether conscience decides it to be right or wrong. Accordingly, a great variety of ethical systems have been proposed. Most modern philosophers consider the subject as apart from theology and as based on independent philosophical principles. Modern systems fall into two great classes—the utilitarian systems, which recognize happiness as the chief good, that is, the greatest possible satisfaction of the tendencies of our nature; and the rationalistic systems, which recognize that ideas of law and obligation can have their source only in reason. Another theory of ethics places the moral principle in the sentimental part of our nature, that is, in the direct sympathetic pleasure or sympathetic indignation we have with the impulses which prompt to action or expression.

E'thiop'ia or **Aethiopia**, in ancient geography, the name applied to the country lying to the south of Egypt and comprising the modern Nubia, Kordofan and Abyssinia. Its limits, however, were not clearly defined. It has been held by some that Egyptian civilization was in a measure received from Ethiopia, but it is generally believed that the reverse was the case. The connection between the two countries was

at all times very close, and about the eighth century B. C. the Ethiopians were able to impose a dynasty on Lower Egypt. Cambyeses, king of Persia, invaded the country about 530 B. C. and destroyed the capital city, Napata. From this time the country is known by the name of the kingdom of Meroë, from the name of the capital city which replaced Napata, and it was this kingdom that Augustus conquered in 22 B. C., making it tributary to Rome. However, the Roman hold on Ethiopia was never very strong.

Ethiopic Language, or, more accurately, Geez language, the old official and ecclesiastical language of Abyssinia. It is a Semitic language, resembling Aramaic and Hebrew, as well as Arabic. It has a Christian literature of some importance, including a translation of the Bible, which contains both Old and New Testaments and the Apocrypha, as well as several supplementary apocryphal books. Besides this, there is a large amount of theological literature, including translations from the Greek fathers, lives of the saints and hymns.

Ethnography, a science that describes human races and peoples; for that reason, a branch of anthropology. The study of foreign races interested the ancients to a certain extent, but it was not until the time of the discovery of America that the civilized peoples made systematic efforts to study and describe other human races. Since that time, however, the ethnographer has been constantly at work, and now the great governments of the world have established bureaus for the purpose of investigating not only their own primitive peoples and the different races that come under their rule, but also the tribes and clans of other nations. At Washington, the bureau of American ethnography devotes itself to the study of our indian tribes.

Ethnology, that division of anthropology which treats of the customs and habits of life and of the arts, religion and government of man, as well as his tribal relations and his distribution over the earth. See RACES OF MEN.

Ethyl Alcohol. See ALCOHOL.

Ethylene. See OLEFIANT GAS.

Etiolation. When a plant grows in the dark, it becomes pale and almost colorless and has much more slender and less vigorous shoots, which sometimes become very long and entirely unlike the normal plant. The change of color is owing to the fact that no chlorophyll can be produced without the aid of sunlight, and the manner of growth is occasioned by the instinctive

search of the plant for light. This change in color and appearance is known as etiolation.

Et'na, PA., a borough in Allegheny co., on the Allegheny River, opposite Pittsburg, and on the Pennsylvania and the Pittsburg & Western railroads. It is a suburb of Pittsburg and contains furnaces, rolling mills, pipe works and other manufactures. Population in 1910, 5830.

Etna or **Aetna** or **Mongibello**, the greatest volcano in Europe, in Sicily, near the city of Catania. Its loftiest summit is 10,755 feet high. It rises immediately from the sea, has a circumference of more than 100 miles and dominates the whole northeast part of Sicily. There are a number of towns on its lower slopes. The top is covered with perpetual snow; at the foot is a region of orchards, vineyards and olive groves; midway is the woody or forest region. Etna thus presents the variety of climates common to high mountains in lower latitudes. A more or less distinct margin of cliff separates the mountain proper from the surrounding plain; and the whole mass seems formed of a series of superimposed mountains, the terminal volcano being surrounded by a number of cones, all of volcanic origin, nearly one hundred of which are of considerable size. From the summit a splendid panorama is presented, embracing the whole of Sicily, the Lipari Islands, Malta and Calabria. The eruptions of Etna have been numerous, and many of them destructive. That of 1169 overwhelmed Catania and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. One eruption was in 1755, the year of the Lisbon earthquake. Among more recent eruptions are those of 1832, 1865, 1874 and 1879. See VOLCANO.

E'ton College, one of the most famous public schools of England, established by Henry VI in 1440, under the name of *The College of the Blessed Mary of Eton beside Windsor*. The original building, begun in 1441, is still occupied, but since that day many additional buildings have been erected. The school was originally intended for the sons of poor but worthy Englishmen and also for the support of twenty-five poor, infirm men. It has now become the school of the gentry and nobility, and the applications are so numerous that it is customary to enter application at the birth of the child, in order to insure his admission by the time he is of proper age. Students are not admitted under twelve

Etruria

years of age or over fourteen. The work of the school is wholly of a preparatory nature, and a large portion of the time is devoted to the study of the classics, though modern languages, mathematics and sciences are now given due attention. The present enrollment is about 1000.

Etru'ria, a name given by the ancient Romans to that part of Italy bounded by the Apennines, the Tiber and the Mediterranean. The inhabitants came originally from Asia Minor, and, according to their own legends, they were settled in Italy and were in a flourishing condition by the middle of the eleventh century B. C. It is certain that at the time of the foundation of Rome Etruria was the most civilized portion of Italy.

There were at one time three Etruscan confederacies, each composed of twelve city states. Each state had its own government, the power being vested in officers called *lucumo*. From the earliest times the Etruscans were engaged in constant warfare with Rome, which terminated in the complete subjugation of Etruria through a series of Roman victories, from the fall of Veii in 396 B. C. to the Battle of Vadimonian Lake in 283 B. C. Their desire for military and commercial supremacy was changed to a love of luxury, and up to the second century B. C. the great Etruscan cities far surpassed Rome in wealth and splendor.

Etruscan art was in the main borrowed from Greece. Great quantities of relics have been found in the tombs, especially jewelry and painted vases, which are popularly called Etruscan vases, though they are undoubtedly productions of Greek workmen. See ETRUSCAN VASES.

Etruria, a kingdom of Italy, founded by Napoleon I in 1801. Its capital was Florence. In 1808 Napoleon incorporated it with the French Empire.

Etrus'can Vases, a class of beautiful, ancient, painted vases, made in Etruria, but not products of Etruscan art, since they were really the productions of Greek workmen, the subjects, style and inscriptions being all Greek. A great number have been found in the tombs in Etruria and in Campania, Sicily. They are elegant in form and are enriched with bands of beautiful foliage and other ornaments and figures of a highly artistic character. One class has black figures and ornaments on a red ground, the natural color of the clay; another has the figures of the natural color and the ground painted black. During a later period of Etruscan art there was

Euboea

much variety in the form and ornamentation of these vases, gold and other colors being frequently made use of in their embellishment.

Et'ty, WILLIAM (1787-1849), an English painter. He studied at the Royal Academy and afterwards traveled in Europe, especially in Italy, where, from his study of the Venetian masters, he acquired his taste for rich coloring, for which his works are principally known. His pictures lack originality and vigor, but the general composition is good. His principal works are a series of three *Judith* pictures, *Ulysses and the Sirens*, *Beniah*, *David's Chief Captain* and three pictures of *Joan of Arc*.

Et'ymol'ogy, a term applied, (1) to that part of grammar which treats of the various inflections and modifications of words and shows how they are formed from simple roots (See GRAMMAR); (2) to that branch of philology which traces the history of words from their origin to their latest form and meaning. Etymology in this latter sense, or the investigation of the origin and growth of words, is among the oldest of studies. Plato and other Greek philosophers, the Alexandrian grammarians, the Roman Varro and others wrote much on this subject. It is not until recent times, and particularly since the study of Sanskrit, that etymology has been scientifically studied. Languages then began to be properly classed in groups and families, and words were studied by a comparison of their growth and relationship in different languages. It was recognized that the development of language is not an arbitrary or accidental matter, but proceeds according to general laws. See PHILOLOGY.

Euboea, *u be'ah*, the largest, and in ancient times the most important, of the Grecian islands in the Aegean Sea. It lies off the eastern coast of central Greece and has a length of 98 miles and an average width of 30 miles. It is traversed by mountains, the loftiest of which reach a height of over 5000 feet. Its fertile soil made Euboea one of the chief sources of the grain supply of ancient Athens, and it still produces grain, oil, figs and wine. The honey of Euboea is highly praised, also. The chief towns are Chalcis and Eretria.

The earliest inhabitants were the Abantes, or Dryopes. About 1100 B. C. the Ionians settled the island and soon raised it to importance. The island became celebrated for its learning, was the seat of the Euboean school of philosophy and for a long time was the home of Aristotle. The state was subdued by Athens after the

Eucalyptus

Persian Wars; in 1470 it was taken by the Turks. Together with the island of Skyros, Euboea forms a province of Greece. Population of the province in 1907, 116,903.

Eucalyptus, a genus of trees, mostly natives of Australia, remarkable for their gigantic size some of them attaining the height of 480 or 500 feet. In the Australian colonies they are known by the name of gum trees, from the gum which exudes from their trunks. The wood is excellent for ship-building and similar purposes. The *blue gum*, famous for its rapid growth and ability to live through long periods of drought, is one of the best known species, and it has now become thoroughly naturalized in California, Florida and others of the Gulf states. The oil of eucalyptus is used medicinally, and a pleasing wine or beer is made from the sap of one species.

Euchre, *u'kur*, a game played by two, three or four persons, with a pack of cards from which all below seven or nine, as may have been agreed upon, have been rejected (See CARDS, PLAYING). Each player is dealt five cards, two together and then three together, after which the trump is turned. If the trump turned is a jack it counts one to the dealer. The one to the left of the dealer may order the dealer to take up the trump, or he may *pass*. He does the former if he thinks he has a hand strong enough to win three tricks, and the dealer, discarding one of his cards, takes up the trump. If the non-dealer passes, the dealer's partner may order up the trump by saying "I assist," or he may pass, and so on, until the dealer's turn comes, when he takes up the card or turns it down, the latter meaning that he, too, passes. If the dealer passes, the first player to his left may make the trump what he likes. It is usually the suit of the same color. If the play passes around the second time and no one makes the trump, the deal passes to the left. It is a rule of the game that suit must be followed whenever possible. The object is to win at least three tricks out of the five, and if the one who made the trump fails to win three, he



BLUE GUM

Eugene

is *euchred*, and his opponent scores two. If he takes five tricks he scores two points. If he wins three or four tricks he scores one point. The cards rank as they do in whist, but in the trump suit the *right bower*, or jack of trumps, stands highest; the *left bower*, the other jack of the same color, is next, then ace, king, queen, and so on, in order, to the lowest. Sometimes in four-handed euchre it is permitted for one of the players to *play it alone*, in which case his partner lays down his cards and takes no part in the hand. If the player wins five tricks he counts four points; if three tricks, one point. If he fails to make three, the opponent scores two. A game of euchre consists either of five or ten points, unless another number is agreed upon. A three-handed game, when two players combine against one, is known as *cut-throat euchre*.

Euclid, *u'klid*, of Alexandria, a distinguished Greek mathematician who flourished about 300 B. C. His *Elements of Geometry*, in thirteen books, are still extant, and the name Euclid is to-day synonymous with elementary geometry. The severity and accuracy of his methods of demonstration have as a whole never been surpassed. Besides the *Elements*, some other works are attributed to Euclid.

Eugene, *u'jeen'*, ORE., the county-seat of Lane co., about 125 mi. s. of Portland, on the Willamette River and the Southern Pacific Railroad. The city has excellent public schools, a business college, private schools and a Bible University. Eugene is the seat of the state university. There is a city hall, a city library, courthouse, theater, a well-equipped fire department, a water system owned by the city, an electric light plant and a street railway system. It is the center of a fertile agricultural district. The manufactures include lumber, flour, foundry products, woolen goods, excelsior and other products. Population in 1910, 9009.

Eugene, *o zhane'*, FRANCOIS (1663-1736), a famous general, commonly known as Prince Eugène of Savoy, born in Paris. Offended with Louis XIV, he entered the Austrian service in 1683, serving his first campaign as a volunteer against the Turks. At the end of the war he was sent as commander in chief to Hungary. The War of the Spanish Succession brought Eugène again into the field, and with the imperial army, in coöperation with Marlborough, he frustrated the plans of France and her allies. In the Battle of Blenheim, Eugène and Marlborough defeated the French and Bavarians, and in the next year, returning to Italy, he forced the

Eugenics

French to raise the siege of Turin and in one month drove them out of Italy. During the following years he fought on the Rhine, took Lille and, in conjunction with Marlborough, defeated the French at Oudenarde and Malplaquet, where he himself was dangerously wounded. After the recall of Marlborough, his progress was in a great measure checked. In the war with Turkey, in 1716, Eugène won two great victories and took Belgrade, after having gained a decisive victory over a third army that came to its relief. During fifteen years of peace which followed, Eugène served Austria faithfully in the cabinet.

Eugenics, the modern science which studies the principles of heredity and attempts to apply them to race improvement. The word *eugenics*, which is from the Greek meaning *good birth*, was first used by Sir Francis Galton, the founder of the science, which he defined as "the study of agencies that may improve or impair the racial qualities of future generations, either mentally or physically."

The laws of heredity declare that the qualities of every child come from his ancestors, near and remote; and experiments with the higher animals prove clearly what may be done if all but the most perfect individuals are eliminated. If, then, the state had the right and the power to prevent marriage and reproduction among all but those who are most fit, physically, mentally and morally, vast differences might be seen in the race within a few generations. But the most enthusiastic advocate of eugenics would deny the desirability of such a course, even were it practicable; for all agree that the science must be kept human, and that love and initiative on the part of those making marriages are factors which must be preserved.

One thing the state can do—prevent the marriage of the feeble-minded and the hereditary criminal classes; and this would in itself be a vast improvement. In earlier and less humanitarian times, those who were feeble in mind or in body tended to be crushed out in the struggle for existence; but the charity of the present day helps to keep such people alive, and at the same time does nothing to prevent their bringing into the world children who can be neither helpful nor happy. Such agencies, too, as war, which cause the death of many of the strongest men, necessarily result in a lower physical standard.

Looked at from any point of view, there are insuperable difficulties in the way of a strict enforcement of the principles of eugenics. Much

Euphrates

can be done, and is being done, however, by the wide spread of the new doctrines among intelligent men and women. For it is through personal enlightenment, rather than through state interference, that the improvement must come.

Eugenie-Marie de Montijo, *o zha ne'mah-re' de mon te'hyo* (1826–), formerly empress of the French. Her father, the Count de Montijo, was of a noble Spanish family; her mother was of Scotch extraction. In 1853 she became the wife of Napoleon III and empress of the French. When the war broke out with Germany she was appointed regent during the absence of the emperor, but the revolution forced her to flee from France. She went to England, where she was joined by her son, and afterwards by the emperor. In 1873 Napoleon died, and six years later the prince imperial was slain while serving with the English army in Africa, in the Zulu War. In 1881 the empress transferred her residence to Farnborough, in Hampshire, England.

Eulenspiegel, *oi'len shpe'g'l*, TILL, a name which has become associated in Germany with all sorts of wild, whimsical frolics and with many amusing stories. Some such popular hero of tradition and folklore seems really to have existed in Germany, probably in the first half of the fourteenth century, and a collection of popular tales, originally written in Low German, purports to contain his adventures.

Euphorbia, *u for'by ah*. See SPURGE FAMILY.

Euphrates, *u fra'teez*, a celebrated river of western Asia, in Asiatic Turkey, having a double source in two streams rising in central Armenia. Its total length is about 1750 miles, and the area of its basin 260,000 square miles. It flows mainly in a southeasterly course through the great alluvial plains of Babylonia and Chaldæa, till it falls into the Persian Gulf by several mouths, of which only one in Persian territory is navigable. About 100 miles from its mouth it is joined by the Tigris, when the united streams take the name of Shat-el-Arab. It is navigable for about 1100 miles, but navigation is somewhat impeded by rapids and shallows. Through its yearly overflow, however, which takes place in the spring, it confers great benefit on the country through which it flows. The river is of great historical importance, having been connected with the Assyrian and Babylonian empires, which were located on its banks. The region between the Euphrates and the Tigris on the east was the ancient Mesopotamia. The



Euphrates is also the Great River of the Old Testament.

Euphuism, *u'fu iz'm*, an affected style of speech, which distinguished the conversation and writings of many of the wits of the court of Queen Elizabeth. The name and the style were derived from the *Euphuus*, the *Anatomy of Wit* and the *Euphuus and His England* of John Lyly.

Eura'sians, a name sometimes given to the "half-castes" of India, the offspring of European fathers and Indian mothers. They are particularly common in Calcutta, Madras and Bombay. The young men are often engaged in government or mercantile offices. The girls, in spite of their dark tint, are generally very pretty.

Eure, *ur*, a river of northwestern France, which rises in the Department of the Orne, flows northeast through the departments of Eure-et-Loir and Eure and falls into the Seine after a course of 112 miles. It is navigable for about half its length. The chief tributary is the Iton, on the left.

Eureka, CAL., the county-seat of Humboldt co., is situated about 216 mi. n. of San Francisco on Humboldt Bay. The city has three miles of water frontage which is lined with lumber yards, planing and shingle mills and other manufacturing establishments. It is the center of the redwood industry. Large quantities of lumber, butter and other products are shipped from here and the yearly average of exports amounts to about \$5,000,000. The city has broad, well paved streets, ample water supply, electric light and power and gas plants, daily papers, banks, an opera house and theaters. It has extensive tanneries and a large woolen mill. An electric railroad is in operation and is being extended. Population in 1910, 11,845.

Eureka, UTAH, a city in Juab co., 66 mi. s. of Salt Lake City, on the Rio Grande Western and the San Pedro, Los Angeles & Salt Lake railroads. It is a mining town and the center of the great Tintic mining district, which produces silver, gold and lead. Population in 1910, 3416.

Euripides, *u rip'i deez* (about 480-406 B. C.), one of the three great tragic poets of Greece. He studied under Prodicus and Anaxagoras and is said to have begun to write tragedies at the age of eighteen, although his first play, the *Peliades*, did not appear until 455 B. C. He was not successful in gaining the first prize in the dramatic competition until the year 441 B. C., and he continued to exhibit till 408 B. C., when he presented the *Orestes*. Euripides is a master of tragic

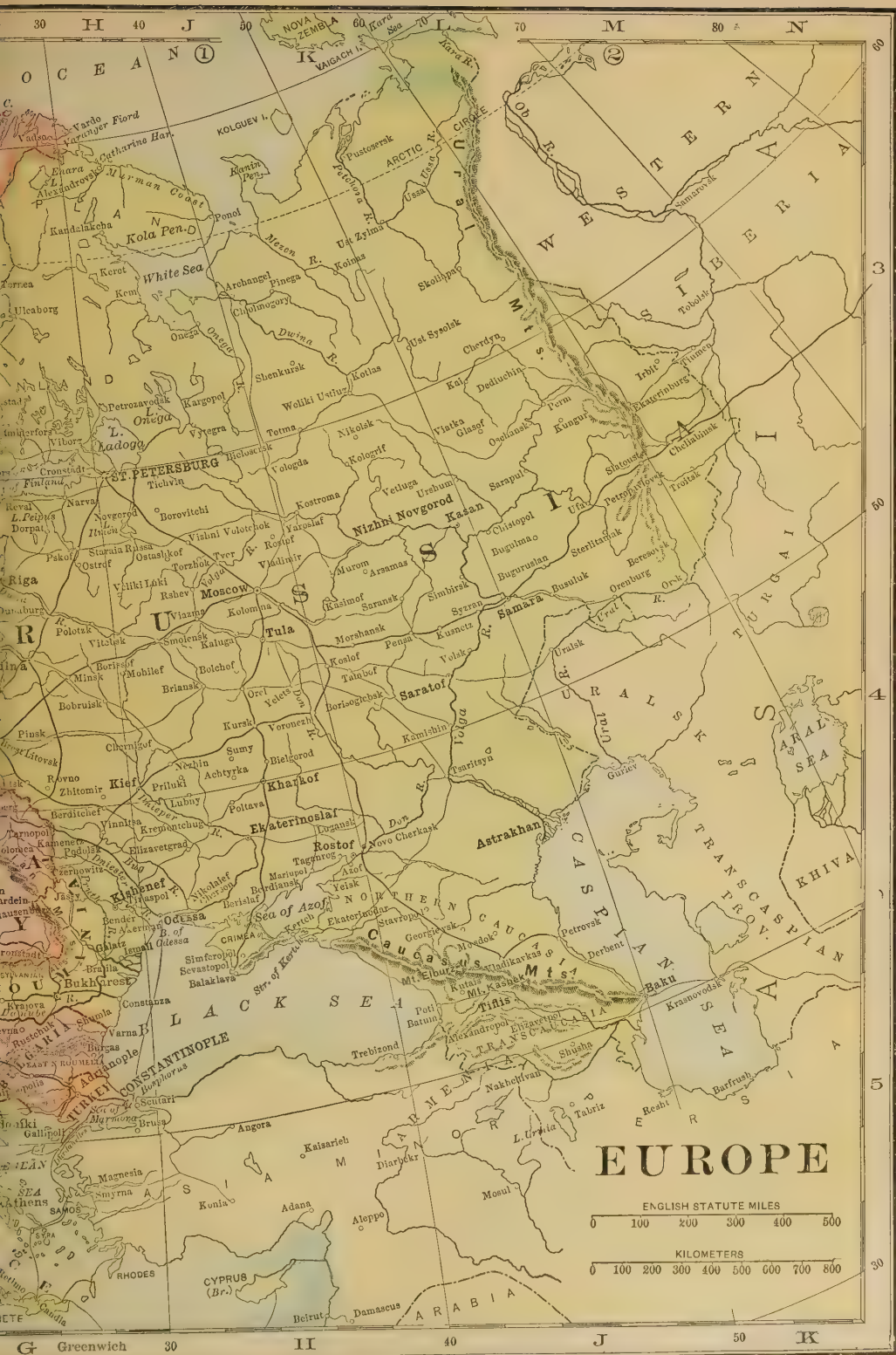
situations and pathos, and shows much knowledge of human nature and skill in grouping characters, but his works lack the artistic completeness and the sublime earnestness that characterize Aeschylus and Sophocles. As a representative of the new order which did not believe in the old gods of Greece, he had more interest in the thoughts and feelings of real persons than in the experiences of the persons in old legends. His characters, it is true, were drawn from mythology, but they were presented as working out their own development, rather than as puppets of the higher powers. Euripides is said to have composed seventy-five, or, according to another authority, ninety-two tragedies. Of these, eighteen are extant, namely, *Alcestis*, *Medea*, *Hippolytus*, *Hecuba*, *Heraclidae*, *Supplices*, *Ion*, *Hercules Furens*, *Andromache*, *Troades*, *Electra*, *Helena*, *Iphigenia in Tauris*, *Orestes*, *Phoenissae*, *Bacchae*, *Iphigenia in Aulis* and *Cyclops*.

Euro'pa, in Greek mythology, the daughter of Agenor, king of the Phoenicians, and the sister of Cadmus. The fable relates that she was carried off by Jupiter, who for that occasion had assumed the form of a bull.

Eur'ope, the smallest of the grand divisions, lies between 71° 11' and 36° north latitude and between 9° 28' west longitude and 66° 20' east longitude. Its greatest length from north to south, between Cape North and Cape Matapan, is 2400 miles, and its greatest dimension east and west is from Ekaterinburg on the east to Cape Saint Vincent on the west, 3400 miles. The area, exclusive of islands, is about 3,560,000 square miles, or, including islands, 3,850,000 square miles. The coast line is very irregular and extended, being longer, in proportion to area, than that of any other grand division. Its length is variously estimated at from 20,000 to 48,000 miles. This variation is due to the method of measurement, the shorter line including only the large indentations, while the longer includes all of the smaller ones. Europe is bounded on the n. by the Arctic Ocean, on the e. by the Ural Mountains, Ural River and Caspian Sea, on the s. by Asia, the Black Sea and the Mediterranean and on the w. by the Atlantic and North Sea. The important coast waters are, on the north, the White Sea; on the east, the Caspian Sea; on the south, the Black Sea and Sea of Azov, the Bosphorus, Sea of Marmora, Dardanelles, Aegean Sea, Adriatic Sea, Gulf of Genoa, Gulf of Lyons and Strait of Gibraltar, and on the west, Bay of Biscay, English Channel,



Hammond's 8 x 11 Map of Europe.
Copyright, 1914, by C. S. Hammond & Co., N. Y.





Corn



Wheat



Millet



Rye



Fir
Foliage and Cone



Madder



Almond
Nut and Flower



Orange



Fig



Olive

Strait of Dover, North Sea, Baltic Sea, Gulf of Bothnia and Gulf of Finland. The Baltic Sea is connected with the North Sea by the Skagerrak and Cattegat. The continent contains a number of important projections. On the west there are the Scandinavian peninsula and Denmark; on the south, Spain, Italy and the Balkan peninsula, containing Turkey and Greece. The surrounding islands of importance are, on the north, Nova Zembla and Kolguev; on the west, the Lofodens, Faroe, Shetland, Orkney, Hebrides and British Isles, near the coast, and Iceland in mid-ocean. The important islands of the Mediterranean are the Balearic Isles, Corsica, Sardinia, Sicily, Crete and the numerous smaller groups in the Ionian and Aegean seas. Most of these islands are out-croppings of the projected mountain ranges, and between them and the continent the sea is comparatively shallow.

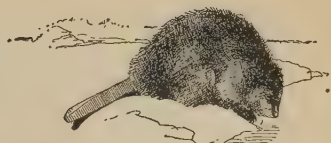
SURFACE AND DRAINAGE. Fully two-thirds of the continent is low land, the larger part of which is a continuation of the great Asiatic plain, which is broken only by the Ural Mountains and has its western terminus in the lowlands of the British Isles. With the exception of the Kjölen Mountains, or Scandinavian Alps, forming the western boundary of the peninsula of the same name, the northern part of the continent is all low, and the plain extending westward includes the northern part of Germany, most of Belgium, the Netherlands and the northern and western part of France. The highlands consist of the main highland region in the south, having the Alps for its center, and numerous lower ranges to the north, the Ural Mountains in the extreme northeast, and the Kjölen in the northwest. The southern highland district is by far the most important. This embraces the Alps and their neighboring ranges and attains its greatest height just north of the Italian peninsula, in Mont Blanc, Monte Rosa, Jungfrau and Matterhorn, with several other peaks, some of which exceed 15,000 feet in altitude. The greatest extent of these mountains is from east to west, and they have a length of nearly 700 miles. The plateau upon which they rest is crossed by minor ranges in various directions, and the southern spurs, namely, the Balkans, Apennines and Pyrenees, with their projections, form the nucleus of the respective peninsulas occupied by Turkey and Greece, Italy, and Spain and Portugal. The Alps are divided by natural passes into three divisions, the western, central and eastern, and through these and other passes means of communication between the north and south have

been maintained for centuries, while now in the neighborhood of three of them—Mount Cenis, Saint Gotthard and Simplon—railroad tunnels have pierced the mountains (See ALPS). North and east of the Alps are the Carpathians, the Jura, the Harz and other minor ranges, with an altitude seldom exceeding 6000 feet, but in a few cases reaching nearly 8000. Between these mountains and the Alps are the great valleys of the Danube and the Upper Rhine, while on the south, between the main range of the Alps and the Apennines, is the valley of the Po, and to the west the Rhone descends to the Mediterranean between the Alps and the eastern extremity of the range connecting the Pyrenees. While the connection of the Pyrenees with the Alps is not evident geographically, geologists generally consider them to form a part of the same mountain system, and these with their western extension, the Cantabrians, form a practically impassable barrier between the Spanish peninsula and the countries to the north. South of these the Sierra Nevada and their branches give the peninsula its rugged and mountainous surface.

Rivers and Lakes. The main European watershed runs in a winding direction from southwest to northeast. At its northeastern extremity it is of very slight elevation. From the Alps descend some of the largest of the European rivers, the Rhine, the Rhone and the Po, while the Danube, a still greater stream, rises in the Black Forest north of the Alps. The Volga, which enters the Caspian Sea, an inland sheet without outlet, is the longest of European rivers, having a direct length of nearly 1700 miles, and, including windings, 2400 miles. Into the Mediterranean flow the Ebro, the Rhone and the Po; into the Black Sea, the Danube, the Dnieper, the Dniester and the Don; into the Atlantic, the Guadalquivir, the Guadiana, the Tagus and the Loire; into the English Channel, the Seine; into the North Sea, the Rhine and the Elbe; into the Baltic, the Oder, the Vistula and the Duna; into the Arctic Ocean, the Dvina. The lakes of Europe may be divided into two groups, the southern and the northern. The former run along both sides of the Alps, and among them, on the north side, are the lakes of Geneva, Neuchâtel, Thun, Lucerne, Zürich and Constance; on the south side, Lago Maggiore and the lakes of Como, Lugano, Iseo and Garda. The northern lakes extend across Sweden from west to east, and on the east side of the Baltic a number of lakes, stretching in the same direction across Finland on the borders



Ermine
In his winter coat



Beaver



Owl



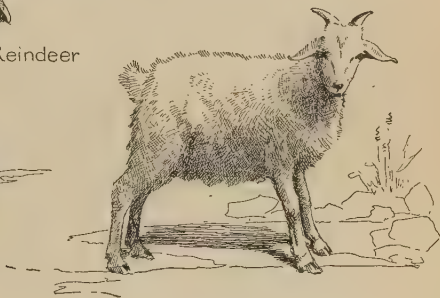
Scandinavian Reindeer



Brown Bear



Mole



Goat



Russian Wolf



Wild Boar



Alpine Ibex

Europe

of Russia, mark the continuation of the line of depression. It is in Russia that the largest European lakes are found—lakes Ladoga and Onega.

MINERAL RESOURCES. Europe possesses abundant stores of those minerals which are of the most importance to man. Coal and iron are found all through the central portion of the highland region, between the fortieth and sixtieth parallels of latitude, and are of sufficient abundance to be profitably worked in Norway, Sweden, Belgium, Germany, France and the British Isles. The Scandinavian peninsula also contains rich silver ore; valuable deposits of quicksilver are found in the Harz Mountains and in Spain, while in the Ural Mountains are stores of copper and platinum. Tin occurs in Great Britain and in Brittany. Italy abounds in marble of excellent quality, and nearly all of the mountainous countries contain extensive quarries of granite, limestone and other building material, while in many localities are clays valuable for the manufacture of brick and pottery.

CLIMATE. Several circumstances concur to give Europe a climate peculiarly genial, such as its position almost wholly within the temperate zone and the great extent of its coast waters. Much benefit is derived also from the fact that its shores are exposed to the warm marine currents and warm winds from the southwest, which prevent the formation of ice on most of its northern shores. The eastern portion has a less favorable climate than the western. The extremes of temperature are greater, the summer being hotter and the winter colder, while the lines of equal mean temperature decline south as they go east. The same advantages of mild and genial temperature which western Europe has over eastern Europe, the continent as a whole has over the rest of the Old World. The diminution of mean temperature, as well as the intensity of the opposite seasons, increases as we go east. Peking, in latitude 40° north, has as severe a winter as Saint Petersburg, in latitude 60°. Throughout the continent there is sufficient rainfall for agriculture, and there are no desert areas.

VEGETATION. With respect to the vegetable kingdom Europe may be divided into four zones. The first, or most northern, is that of fir and birch. The birch reaches almost to North Cape; the fir ceases a degree farther south. The cultivation of grain extends farther north than might be supposed. Barley ripens even under the 70th parallel of north latitude; wheat ceases at 64° in Norway, 62° in Sweden. Within this

Europe

zone, the southern limit of which extends from latitude 64° in Norway to latitude 62° in Russia, agriculture has little importance, the inhabitants being chiefly occupied with the care of reindeer or cattle, and in fishing. The next zone, which may be called that of the oak and beech and cereal produce, extends from the limit above mentioned to the 48th parallel. The Alps, though beyond the limit, by reason of their elevation, belong to this zone, in the more moist parts of which cattle husbandry has been brought to perfection. Next is the zone of the chestnut and vine, occupying the space between the 48th parallel and the mountain chains of southern Europe. Here the oak still flourishes, but the pine species become rarer. Rye, which characterizes the preceding zone on the continent, gives way to wheat, and in the southern portion of it to maize, also. The fourth zone, comprehending the southern peninsulas, is that of the olive and evergreen woods. The orange flourishes in the southern portion and rice is cultivated in a few spots in Italy and Spain. See full page plate, *Plants of Europe*.

ANIMAL LIFE. The reindeer and polar bears are peculiar to the north. Bears and wolves still inhabit the forests and mountains; but, in general, cultivation and population have expelled wild animals. The domesticated animals are nearly the same throughout the continent. The ass and mule lose their size and beauty north of the Pyrenees and Alps. The Mediterranean Sea has many species of fish, but no great fishery; the northern seas, on the other hand, are annually filled with countless shoals of a few species, chiefly the herring, mackerel, cod and salmon. See full page plate, *Animals of Europe*.

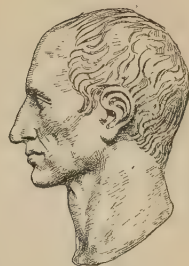
INHABITANTS. Europe is occupied by several different peoples or races, in many parts now greatly intermingled. The Celts once possessed the west of Europe, from the Alps to the British Islands. But the Celtic nationalities were broken by the wave of Roman conquest, and the succeeding invasions of the Germanic tribes completed their political ruin. At the present day the Celtic language (See CELTS) is spoken only in the Scotch Highlands (Gaelic), in some parts of Ireland (Irish), in Wales (Cymric) and in Brittany (Armorican). Next to the Celtic comes the Teutonic race, comprehending the Germanic and Scandinavian branches. The former includes the Germans, the Dutch and the English. The Scandinavians are divided into Danes, Swedes and Norwegians. To the east of the Teutonic race, though sometimes mixed with



DAVID. Michelangelo



VICTORY OF SAMOTHRACE



JULIUS CAESAR



VENUS OF MILO



LAST DAY OF NAPOLEON. • Vela



DISCOBOLUS OF NAUCYDES



DETAIL FROM THE FRIEZE OF THE PARTHENON. Praxiteles

Europe

it, come the Slavonians, that is, the Russians, the Poles, the Czechs or Bohemians, the Servians, Croatsians and a few others of lesser importance. In the south and southeast of Europe are the Greek and Latin peoples, the latter comprising the Italians, French, Spanish and Portuguese. All the above peoples are regarded as belonging to the Indo-European, or Aryan, stock. To the Mongolian stock belong the Turks, Finns, Lapps and Magyars, or Hungarians, all immigrants into Europe in comparatively recent times. The Basques, at the western extremity of the Pyrenees, are a people whose affinities have not been determined (See *BASQUE*). The total population of Europe is about 390,000,000. The prevailing religion is the Christian, embracing the Roman Catholic Church, which is the most numerous, the various sects of Protestants—Lutheran, Calvinistic, Anglican, Baptists, Methodists—and the Greek Church. A part of the inhabitants profess the Jewish, a part the Mohammedan, religion.

POLITICAL DIVISIONS. The independent states of Europe are as follows: Andorra, Austria-Hungary, Belgium, Bulgaria, Denmark, France, Germany, Great Britain, Greece, Italy, Liechtenstein, Luxemburg, Monaco, Montenegro, the Netherlands, Norway, Portugal, Rumania, Russia, San Marino, Serbia, Spain, Sweden, Switzerland and Turkey.

HISTORY. Europe was probably first peopled from Asia. The first authentic history begins in Greece at about 776 B. C. Greek civilization was at its most flourishing period about 430 B. C. After Greece came Rome, which, by the early part of the Christian era, had conquered Spain, Greece, Gaul, Helvetia, Germany between the Danube and the Alps, Illyria, Dacia and a few other regions. Improved laws and superior arts of life spread with the Roman Empire throughout Europe, and the unity of government was also extremely favorable to the extension of Christianity. With the decline of the Roman Empire a great change in the political constitution of Europe was produced by the universal migration of the northern nations. The Ostrogoths and Lombards settled in Italy, the Franks in France, the Visigoths in Spain and the Anglo-Saxons in South Britain, reducing the inhabitants to subjection or becoming incorporated with them. Under Charlemagne (771-814) a great Germanic empire was established, so extensive that the kingdoms of France, Germany, Italy, Burgundy, Lorraine and Navarre were afterwards formed out of it. About this time the north-

Eusebius of Caesarea

ern and eastern nations of Europe began to exert an influence in the affairs of the continent. The Slavs, or Slavonians, founded kingdoms in Bohemia, Poland, Russia and the north of Germany; the Magyars appeared in Hungary, and the Normans agitated all Europe, founding kingdoms and principalities in England, France, Sicily and the East. The Crusades and the growth of the Ottoman power are among the principal events which influenced Europe from the twelfth to the fifteenth century (See *CRUSADES*; *TURKEY*). The conquest of Constantinople by the Turks (1453), by driving the learned Greeks from this city, gave a new impulse to letters in western Europe, which was carried onward by the Reformation and the invention of printing (See *PRINTING*; *REFORMATION*). The discovery of America was followed by the temporary preponderance of Spain, then of France, in Europe. Subsequently, Prussia and Russia gradually increased in territory and strength. The French Revolution (1789) and the Napoleonic wars had a profound effect on Europe, the dissolution of the old German Empire being one of the results. Since then the most important events in European history have been the establishment of the independence of Greece; the disappearance of Poland as a separate state; the unification of Italy under Victor Emmanuel; the Franco-German War, resulting in the consolidation of Germany into an empire under the leadership of Prussia; the partial dismemberment of the Turkish Empire and the war between Turkey and Greece (1897); the Spanish-American War (1898), which deprived Spain of her chief colonies; the Anglo-Boer War (1899), which strengthened Great Britain's hold upon Southern Africa; the Russo-Japanese War (1904) which deprived Russia of her supremacy in the Far East; the Turko-Italian War (1911-1912), by which Italy gained possession of Tripoli, and the Turko-Balkan War (1913), which left Turkey no territory in Europe except Constantinople. For fuller details, see articles on the different political divisions, sub-head *History*.

Eusebius of Caesarea (about 260—about 340), a famous Church historian. He was forced during persecution under Maximinus to flee for his life to Egypt, but returned, and in 313 was made bishop of Caesarea. During the Council of Nice, he led the moderate party of the Arians. The emperor Constantine was the friend and admirer of Eusebius. Among the works of Eusebius are *History of the World to*

the *Time of Constantine*, a work which contained extracts from heathen authors whose teaching Eusebius believed led up to that of Christianity; and a history of the Christian Church to 324.

Eustachio, *a oos tah'ke o*, BARTOLOMMEO (?-1574), an Italian surgeon, whose discoveries in anatomy made him famous. To him anatomists are indebted, among other things, for the first accurate knowledge of the internal ear and its structure, of the development of the teeth and of the structure of the kidneys.

Eus'tis, JAMES BIDDLE (1834-1899), an American lawyer and statesman. He graduated at Harvard Law School in 1854 and practiced law until the war broke out. As judge advocate he served on the staffs of the Confederate generals Magruder and Johnston, till the close of the war. He was twice United States senator and later minister to France.

Eustis, WILLIAM (1753-1825), an American physician and politician, born at Cambridge, Mass., and educated at Harvard University. He served in the Revolutionary War as a surgeon and later was elected to Congress by the Anti-Federalists, serving two terms. From 1809 to 1813 he was secretary of war and for four years was minister to Holland. On his return he again entered Congress and from 1823 until his death was governor of Massachusetts.

Eu'taw Springs, BATTLE OF, an important battle of the American Revolution, fought September 8, 1781, about 60 mi. n. w. of Charleston, S. C., between an American force of 2000 under General Greene and about an equal British force under General Stuart. The battle began about 4 A. M. in an engagement in which the Americans were victorious; but later in the day the British rallied and held their ground. However, after the fight they retreated toward Charleston. This battle closed Greene's famous campaign in the South, by which he compelled the enemy to retire to Charleston, there to remain during the rest of the struggle.

Euterpe, *u tur'pe*, in classical mythology, the Muse who presided over lyric poetry. The invention of the flute was ascribed to her, and she was usually represented as a virgin crowned with flowers, holding a flute in her hand.

Evangelical, *e van jel'i kal*, **Alliance**, an association of the members of various evangelical denominations throughout the United States and Europe, for the purpose of unifying the efforts of Christian churches and extending the Christian faith. The alliance was organized in

London in 1846 and includes Baptists, Independents, Lutherans, Methodists, Moravians, Presbyterians, the Reformed Church and a few other denominations. The countries represented are England, France, Germany, Ireland, Scotland, Switzerland and the United States. Branches are also found in many of the British colonies. The American branch was organized in 1867. International conferences are held at intervals of from two to four years. The most important work accomplished by this organization has been the promotion of religious liberty and the assistance it has given to the setting aside of denominational barriers and the bringing of various evangelical churches together on lines of work in which all Christian people are generally interested.

Evangelical Association, a religious denomination, formed among the Germans in Pennsylvania in 1807. In its doctrines and church polity it very closely resembles the Methodist Episcopal Church. Owing to a difference of opinion in regard to methods of management, the organization divided in 1891, one branch being known as the United Evangelical Church and the other as the Evangelical Association. A large proportion of the followers are of German extraction, though there is a considerable English-speaking membership. Besides the conferences in the United States there are conferences in Germany, Switzerland and Japan. Its publications are issued in both the English and German languages.

Ev'ans, MARY ANN or MARIAN. See ELIOT, GEORGE.

Evans, ROBLEY DUNGLISON (1846-1912), an American naval officer, born in Virginia and educated at the United States Naval Academy at Annapolis. During the Civil War he was present at both attacks on Fort Fisher, and in the second he was wounded. Returning to the service in 1866, he occupied various positions until 1896, when he was put in command of the *Indiana*. During the Spanish-American War he commanded the *Iowa* and took a prominent part in the capture of the Spanish fleet off Santiago. In 1901 he was made rear admiral.

Ev'anston, ILL., a city in Cook co., on Lake Michigan, just north of the limits of Chicago and 12 mi. from the center of the city. It is on the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads, and it also has electric railway connection with Chicago and the many towns to the north along the lake shore. The city is beautifully located and is

exclusively a residence place, being practically a suburb of Chicago. It was the home of Miss Frances Willard. Northwestern University, Garrett Biblical Institute, the Norwegian-Danish Theological School, Swedish Theological Seminary and Visitation Academy are located here. Evanston was settled about 1835 and was incorporated in 1890. Population in 1910, 24,978.

Evanston, Wyo., the county-seat of Uinta co., in the southwestern part of the state, on the Bear River and on the Union Pacific railroad. The city is in a stock-raising and coal-mining section. Oil is found in the vicinity, and the industries include railroad shops and flour and lumber mills. The state institution for the insane is located here. Population in 1910, 2583.

Evansville, IND., the county-seat of Vanderburg co., on the Ohio River, 180 mi. s. w. of Indianapolis, on the Illinois Central, the Louisville & Nashville, the Southern, the Evansville & Terre Haute and other railroads. Prominent buildings are the city hall, the courthouse, the customhouse, Evans Hall, the state hospital for the insane and the United States marine hospital. Lumber milling is the chief industry, and the city is one of the greatest hardwood lumber markets in the world. There are steel works and numerous other factories, producing harness, saddlery, engines, boilers, furniture, flour, liquors, chemicals and other goods, and there is also a valuable trade in coal, grain, tobacco and flour. Evansville became the county-seat in 1819 and was chartered as a city in 1847. Population in 1910, 69,647.

Evap'ora'tion, the conversion of a liquid or solid by heat into vapor or steam, which becomes dissipated in the atmosphere. The process of evaporation is constantly going on at the surface of the earth, but principally at the surface of the sea and of lakes, rivers and pools. The vapor thus formed, being specifically lighter than atmospheric air, rises to considerable heights above the earth's surface; and afterward, by a partial condensation, forms clouds and finally descends in rain. As heat is required to produce evaporation, the process is a cooling one to the atmosphere. Different liquids vary in the rapidity of their evaporation, and the rate is modified, too, by the character of the vessel in which the liquid is placed, as well as by other causes.

Ev'arts, WILLIAM MAXWELL (1818-1901), an American lawyer and statesman, born in Boston.

He graduated at Yale in 1837, studied law at Harvard and was admitted to the bar in New York City in 1841. He was assistant district attorney in New York City and rose rapidly in his profession, being made counsel for President Johnson in the impeachment trial and leading counsel for the United States in the Alabama Claims controversy. In the Hayes-Tilden contest he managed the case for Hayes before the commission and was made by him secretary of state. Evarts was elected to the United States Senate in 1885, serving until 1891, when he retired to private life.

Ev'elet'h, MINN., a town of Saint Louis co., on the Duluth & Iron Range and the Duluth, Missabe & Northern railroads, 71 mi. n. n. w. of Duluth. The surrounding district yields much iron, and Eveleth has interests connected with the iron industries. Population in 1910, 7036.

E'vening Schools. The European evening schools were probably the outgrowth of Sunday schools which, about the middle of the eighteenth century, added to their religious teaching instruction in the common branches. In most European countries at that time education was not compulsory, and these night schools enabled many children to obtain an education of which they would otherwise have been deprived. Night schools are now maintained in Germany, Switzerland and Great Britain at the expense of the State and are open to pupils of both sexes.

The evening schools in the United States began about 1850, and they now form a part of the educational system of nearly all large cities. Their sessions usually continue from November to March. Pupils are admitted without regard to age, nationality or previous education. The methods of instruction and subjects taught often differ widely from those in the day schools. Many pupils are foreigners and attend for the purpose of learning English. Newspapers are often used in the place of text-books, and in the best schools the greatest freedom is maintained between teachers and pupils. The purpose is to adapt the teaching to the needs of the individual pupil and to enable him, during the time that he can attend the school, to obtain the greatest possible benefit. Arithmetic, writing, English, other common branches and commercial branches are taught. In large cities special institutions, such as the Drexel Institute in Philadelphia and Cooper Union in New York, maintain evening classes, in which instruction of a high order is given. The Young Men's Christian Association

also maintains evening schools in most of the large cities. In these all branches are taught, from the most elementary to those required for a college degree.

Evening Star or Hesperus, the name given to the planet Venus when visible in the evening. See VENUS.

Ev'arest, MOUNT, a mountain of the Himalayas, the highest known summit in the world, being about 29,000 feet high. It received its name from Sir George Everest, a surveyor-general of India.

Ev'rett, MASS., a city in Middlesex co., 3 mi. n. of Boston, on the Boston & Maine railroad and connected by electric railways with the neighboring towns. It is primarily a residence place, but it also has a number of manufacturing plants, including chemical, gas and coke works, and iron, steel and woolen mills. The city contains the Parlin and Shute libraries and Whidden Hospital. Everett was settled in 1643, but remained a part of Malden until 1870. Population in 1910, 33,484.

Everett, WASH., the county-seat of Snohomish co., 33 mi. n. of Seattle, on Puget Sound and on the Northern Pacific, the Great Northern and a branch of the Chicago, Milwaukee & Puget Sound railroads. The city has an excellent harbor and is in a productive agricultural, lumbering and mining region. There are railroad shops, shipyards, iron works, paper mills, large sawmills, a smelter and many other establishments. Everett was settled in 1891, was incorporated two years later and has experienced a rapid growth on account of its natural advantages. It has a public library, United States customs and assayer's offices, a theater, a hospital and many well-constructed brick buildings. Population in 1900, 7838; in 1910, 24,814.

Everett, EDWARD (1794-1865), an American statesman and author, born at Dorchester, Mass., educated in Boston and at Harvard College. He entered the Unitarian ministry, but resigned in 1815 and traveled in Germany and England, returning in 1819 to occupy the chair of Greek literature at Harvard. He became editor of the *North American Review* and, entering politics, became successively member of Congress, governor of Massachusetts and minister plenipotentiary to England. In 1845 he was appointed president of Harvard College and in 1852 became secretary of state. He was then elected United States senator as a conservative Whig, but resigned in 1854. In 1860 Everett was nominated for vice-president by the Constitutional Union

party and received 39 electoral votes. Shortly after, he retired to private life. He is considered one of the greatest American orators.

Everglades, *ev'ur glaydz*, a low, marshy tract of country in southern Florida, inundated with water and interspersed with low islands, covered with high grass and trees. The swamp is 140 miles long and 50 miles broad.

Ev'ergreen, a name given somewhat carelessly to any plant that retains its leaves throughout all seasons, but more especially to trees and shrubs of the pine family (See CONIFERAE). As a matter of fact evergreens shed their old leaves annually, but not until after the new foliage has been formed, so that the change is not noticeable.

Everlasting Flower, a name given to a number of different species, all of which can be kept for an indefinite time without losing their color or form. See IMMORTELLE.

Ev'idence, in law, any means by which the truth or falsity of a fact relevant to an action at law is established. Certain principles have become well established regarding the introduction of evidence:

1. It must be relevant to the question at issue; that is, it must directly or indirectly tend to prove or disprove a fact set up by either party to the controversy. However, if its bearing is too remote it is generally excluded.

2. No evidence which is not known to the witness can be given by him, that is, he cannot offer hearsay evidence—statements made by others, of the truth of which he has no certain knowledge. There are, however, exceptions to this rule: (a) Written statements or confessions of a party to a case may be introduced against him, on the principle that they are probably true if they are opposed to his interests; (b) officially reported testimony in a prior case over the same question may be admitted; (c) the declarations made by a person who is dying or believes himself to be dying may be introduced in murder trials; (d) entries in books or memorandums made in the usual course of a business transaction, by one who afterward died and who had personal knowledge of the matter which he recorded, may be admitted, provided that such a record was made in pursuance of duty; thus, a diary entry would not be admissible; (e) statements by persons present at a certain event may be introduced to prove incidents connected with the event.

3. Evidence may consist of other things than the sworn testimony of witnesses; as, parts of clothing, weapons or machinery, finger prints

or documents. However, it is always necessary to introduce other evidence to identify the objects offered as evidence.

4. Oral evidence cannot as a rule be introduced to contradict the statements in a written instrument or contract. There are, however, exceptions to this rule; for instance, where the parties to the contract did not originally agree to place all the conditions of the contract in writing, or where there is a subsequent oral agreement between the parties or where it is sought to prove that the contract is not in force because of the non-performance of an agreed condition.

5. Witnesses can testify as to facts only, and are not allowed to give opinions or inferences, the natural consequences of the facts being left to the jury for determination.

6. A witness cannot testify unless he is under oath to speak the truth. He need not give any testimony which tends to incriminate himself. However, if he chooses to do so, the evidence is competent and, having waived his privilege, the witness must testify fully.

7. In the examination of witnesses, an attorney cannot ask his own witness, that is, a witness called in the behalf of his client, leading questions, that is, questions which indicate the answer which is desired. At the close of the direct examination the counsel for the opposing side may cross-examine the witness. In this examination he may ask leading questions and may ask, also, questions irrelevant to the exact point at issue, in order to impeach the credibility of the witness. However, the witness may refuse to answer such questions.

The burden of proving any fact set up in a trial rests with the party asserting that fact and must be sustained by a preponderance of evidence. Thus, in criminal trials the burden of proof is with the prosecution, which must prove its accusations beyond any reasonable doubt. A few facts in a case of this sort need not be proven, since the court will take notice of them of its own will. This is known as *judicial notice*. Among such facts are those of common and universal knowledge, such as the calendar or multiplication table, and facts which are presumed to follow from certain other facts. See ACTION; COURTS; JURY AND TRIAL BY JURY; LAW; PROCEDURE; WITNESS.

Ev'olu'tion, a term used to indicate the process of growth by which any race, genus or species of living things becomes superior or inferior to those from which it sprung. While evolution in its broadest sense applies to all lines of devel-

opment, in its ordinary use the term is restricted to the biological sciences. Evolution differs from development in having a broader application. Development applies to what transpires in the case of an individual, while evolution applies to the development of a race. The general theory of evolution is that whatever now exists has descended naturally from what existed in the past, and that nothing new is created; that all of the different forms of life which we see about us have been descended in the process of time from simpler forms, and that these in turn came from still less complex ancestors, so that the line of descent extends backward till it is lost in the beginnings of things. Scientific evolution does not pretend to account for the origin of things. It assumes their creation and accounts for what occurs afterward.

Evolution is based upon evidence found in plants and animals now existing and upon that obtained through the study of geology. Nearly all are familiar with certain changes that take place in the structure of plants and animals from one generation to another, and those engaged in breeding plants and domestic animals use this knowledge in the production of new varieties and in the perfection of varieties already existing. The geologist is able to show us extinct forms of life which served to bridge over the chasms between existing species and so increase the closeness of relationship. The student of zoölogy is aware of the strong resemblance in structure between reptiles and birds. The geologist shows forms which indicate that the earliest birds were winged reptiles with feathers and with teeth. This fact clearly understood, it is easy to believe that the birds now existing may have sprung from reptiles in a period long before the existence of man upon the earth.

When first advanced, the doctrine of evolution was strongly opposed by many who failed to grasp the fundamental idea in the theory and believed that it tended to atheism; but with better acquaintance with the facts, the application of the theory to the development of life was seen to be amply substantiated, and under the leadership of Darwin, Herbert Spencer and others it became thoroughly established and at the present time is more generally accepted than ever before.

Evolution, in mathematics. See ROOT.

Ewell, *u'el*, RICHARD STODDERT (1817-1872), an American soldier, born in Washington, D. C., and educated at West Point. He served with distinction in the Mexican War, attaining the

rank of captain, and took part in indian campaigns in 1857. On the outbreak of the Civil War, he resigned from the Union army and entered the Confederate service. He was made major general, commanded a division at both battles of Bull Run and at Antietam, and after the death of "Stonewall" Jackson he commanded the latter's corps, with the rank of lieutenant general. He played an important part in the battles of Gettysburg and the Wilderness, but was captured with his entire force by Sheridan, April 6, 1865.

Ew'ing, THOMAS (1789-1871), an American statesman, born in Virginia. He graduated from the university at Athens, Ohio, studied law, and attained distinction at the bar. In 1831 he was elected to the United States Senate, retired at the close of his term, but in 1841 was appointed secretary of the treasury and was the first man to hold the office of secretary of the interior, to which he was appointed by Fillmore in 1849. He was regularly elected to the Senate in 1850 and held his seat one year. He ranked among the foremost lawyers of the nation.

Exchange', in commerce, that species of transactions by which the debts of individuals residing at a distance are canceled by order, without the transmission of specie. Thus, a merchant in Chicago who owes \$500 for goods bought in New York, gives a bill, or order, for that amount, which can be offset through banking agencies, or otherwise, against similar debts owing by parties in New York to persons in Chicago. The creditor of Chicago is thus paid by the New York debtor and *vice versa*, and the expense and risk of transmitting money is thus obviated. The process of liquidating obligations between different nations is carried on in the same way, by an exchange of foreign bills. Exchange is said to be *at par* when a bill drawn in New York for the payment of £100 sterling in London can be purchased there for £100. If it can be purchased for less, exchange is said to be *under* or *below par* and is against London. If the purchaser is obliged to give more, exchange is *above par* and is in favor of London. Although the thousand circumstances which incessantly affect the value of money prevent the ordinary course of exchange from ever being precisely at par, its fluctuations are confined within narrow limits, and if direct exchange is unfavorable between two countries, this can often be obviated by the use of bills drawn on other countries where an opposite state of affairs prevails. See **BILL OF EXCHANGE**.

Ex'cise Tax, a tax upon commodities, usually levied at the time of selling or of bringing to market. It has been an essential feature of the English fiscal system for many years and under the name of *internal revenue* is familiar in America. It is usually and most satisfactorily applied to luxuries whose use is apt to become a vice, as liquors and tobacco. Though it has always been opposed wherever levied, on account of the severe measures taken to apprehend and punish evaders of the tax, it is generally considered the most productive and the least objectionable of all taxes. The first excise tax in American history was proposed by Alexander Hamilton in March, 1790, and was soon adopted. It resulted in the Whisky Insurrection in Pennsylvania in 1794 (See WHISKY INSURRECTION). At first laid only upon liquors, the need of revenue led to the imposition of the tax upon such common articles as carriages, sugar, licenses and some legal instruments.

The Democratic party, which came into power in 1801, abolished all excise taxes and has ever since resolutely opposed the excise as a form of sumptuary legislation (See SUMPTUARY LAWS). However, an excise law was found necessary during the War of 1812, but was repealed in 1817. No further legislation of this kind was passed until the opening of the Civil War, when the most comprehensive law yet enforced was enacted by the United States Congress. Rhodes has said it might be called, with a fair degree of accuracy, "a law that taxed everything." The rates were increased step by step as the demands for revenue increased, but after the close of the war the taxes were gradually repealed and the rates of those remaining were lowered. After 1870 few changes were made until the outbreak of the Spanish-American War, when taxes were again imposed upon numerous articles, especially proprietary articles, and the tax on liquors and tobacco was doubled. With the return of peace, the law was again repealed, the last vestige of the war tax being abolished by March, 1902. See **TAX**.

Excre'tions. See SECRETIONS; SWEAT; URINE.

Exec'utive, that branch of the government of a country by which the laws are carried into effect or the enforcement of them superintended. The term is used in distinction from the *legislative* and the *judicial* departments, and it includes the supreme magistrate, whether emperor, king, president or governor, his cabinet, or ministers, and a host of minor officials.

Exec'utor, in law, one appointed by a person's last will to carry its provisions into execution after the testator's death. The testator may, by the common law, appoint any person of sound mind and discretion, though otherwise under some legal disabilities as to contracting and transacting business in general, such as a married woman or a minor. The duties of executors and of administrators are, in general, the same, the difference of the two depending mostly on the mode of appointment, the executor being nominated by the testator, the administrator being appointed by the judge of probate. An executor is liable for any loss occurring to the estate through negligence, or for paying legatees before all debts are discharged. See **WILL**; **DESCENT**.

Ex'eter, a city, port and Parliamentary and municipal borough of England, in the County of Devon, on the left bank of the Exe, 10 mi. n. w. of its mouth, 170 mi. w. s. w. of London. Its chief building is the cathedral, founded in 1112, celebrated for its beauty of architecture and for its unique transept towers, which are the only towers of the kind in England. The cathedral measures 408 feet in length and 140 feet in width. Other ancient buildings are the Guild Hall, dating from the fifteenth century; remains of the castle of Rougemont; the Albert Memorial Museum; Saint John's Hospital; Victoria Hall, and Saint Michael's Church. Exeter has iron foundries and manufactories of agricultural implements and paper mills, and it is the center of the Honiton lace trade. The city is the oldest continuously inhabited city of England. It was a British settlement long before the invasion of the Romans, under whom it was known as Isca Damnoniorum. Population in 1911, 48,660.

Exhibition, *eks'hy bish'un*, **INDUSTRIAL**, an exhibition of works of industry and art, for the purpose of exciting public interest and promoting trade and manufactures. In 1798 an industrial exhibition of the products of French industry was held at Paris and proved so successful that in 1802, during the consulate of Napoleon, another was held, and a series of them was held at intervals, the eleventh, and last, at Paris in 1849. In Britain, exhibitions of a local nature were held in Dublin, Manchester, Liverpool and Birmingham, and annually in London. In 1855 the first French Exposition Universelle was opened in Paris. The buildings were erected in the Champs Elysées and covered about twenty-four acres. There were in all about

24,000 exhibitors. This was followed in 1862 by the great international exhibition held in London, at which the famous Crystal Palace was erected. The second French international exhibition was opened in April, 1867. It was erected on the Champ de Mars and covered about thirty-seven acres. The exhibitors numbered nearly 50,000, the visitors about 10,000,000. A great exhibition was held at Philadelphia in 1876 upon the occasion of the centennial festival of the American Declaration of Independence. It occupied 60 acres and had nearly 10,000,000 visitors. A third French international exhibition was held at Paris in 1878, the area occupied amounting in all to 140 acres, the visitors numbering about 17,000,000. A fourth was held in 1889, partly intended to commemorate the centenary of the French Revolution. One of the features in connection with it was the famous Eiffel Tower of iron. In 1883 a series of exhibitions began at South Kensington, London, where the exhibits were confined to articles having relation to a special department. In 1893 an international exhibition of majestic proportions was held in Chicago, Ill., to commemorate the four hundredth anniversary of the discovery of America. In 1900 an international exhibition was held in Paris, and in 1904 an exhibition commemorating the Louisiana Purchase was opened at Saint Louis. In America, in recent years, there have been numerous smaller exhibitions for special purposes, notably those at San Francisco, Cal., Atlanta, Ga., Nashville, Tenn., Omaha, Neb., Buffalo, N. Y., Charleston, S. C., and Portland, Ore. See **CENTENNIAL EXPOSITION**; **LOUISIANA PURCHASE EXPOSITION**; **LEWIS AND CLARK EXPOSITION**; **SOUTH CAROLINA EXPOSITION**; **PAN-AMERICAN EXPOSITION**; **WORLD'S COLUMBIAN EXPOSITION**; **TRANS-MISSISSIPPI EXPOSITION**; **ALASKA-YUKON-PACIFIC EXPOSITION**.

Exogenous, *eks'oj'e nus*, **Plants**, formerly the name of a primary class of plants, now called *dicotyledons*. See **BOTANY**.

Exorcism, *eks'or siz'm*, the casting out of evil spirits by certain forms of words or ceremonies. An opinion prevailed in the ancient Church that certain persons, particularly those who were afflicted with madness or epilepsy, were possessed by evil spirits. Over such persons forms of conjuration were pronounced, and this act was called exorcism. There were even certain men who made this a regular profession and were called exorcists. Exorcism still forms a part of the beliefs of some churches.

Expan'sion, in physics, the enlargement or increase in the bulk of bodies, in consequence of a change in their temperature. This is one of the most general effects of heat, being common to all bodies whatever, whether solid or fluid. The expansion of fluids varies considerably, but, in general, the denser the fluid the less the expansion; thus, water expands more than mercury and spirits of wine more than water. Commonly, also, the greater the heat, the greater is the expansion; but this is not universal, for there are cases in which expansion is produced, not by an increase, but by a diminution of temperature. Water, in cooling, ceases to contract at 42° F., and it has its maximum density at 39.2° F. Just before it reaches the freezing point, 32°, it begins to expand again and expands more and more rapidly as the freezing point is reached. This expansion is about one-eleventh of its bulk, and accounts for the bursting of pipes and other vessels when water freezes in them.

Expansion, TERRITORIAL, OF THE UNITED STATES. See UNITED STATES, subhead *History*.

Ex'pecta'tion, the value of the prospect of gaining some prize or property depending upon the happening of an uncertain event. A sum of money in *expectation* upon a certain event has a determinate value before that event happens. If the chances of receiving or not receiving a hundred dollars, when an event arrives, are equal, then, before the arrival of the event the expectation is worth half the money. *Expectation of life* is the probable duration of the life of individuals of any given age. A rough estimate of any one's expectation of life is made by calculating two-thirds of the difference between his or her present age and eighty.

Explo'sion, a sudden bursting, generally due to the rapid production of gaseous matter from solids or liquids. Thus, the explosion of gunpowder is due to the sudden formation and expansion of gases into which the powder is converted by chemical agency. Explosions are often caused by the elastic force of confined steam.

Expo'nent, in algebra. See POWER, in mathematics.

Ex Post Fac'to (Latin, "from something done afterward"), in law, something done after and bearing upon something previously done; thus, a law is said to be *ex post facto*, or retroactive, when it is enacted to punish an offense committed before the passing of the law.

Express' Company, a company or association which transports parcels for hire. This business began in the custom of stage drivers of carrying packages from one point in their route to another, for a small consideration, but it was first introduced as a separate business in 1839 by William F. Harnden. It soon grew to immense proportions and has extended its field to cover, besides the delivery of parcels, the issuance of checks, or money orders, similar to the postal money orders (See POSTOFFICE), the collection of debts and even the acceptance of deposits for safe keeping. By means of C. O. D. methods, that is, collection on delivery, goods are transported for merchants and delivered to consumers upon payment of the purchase price. The use of express money orders, or letters of credit, in foreign travel is becoming more common, perhaps, than any other means of carrying funds. In Europe the express business is generally transacted by the postoffice departments of the governments.

Exten'sion, in physics, that property of matter by which it occupies a portion of space. Extension is a general property of matter, for it is impossible to conceive of matter, even in the minutest portion, without connecting with it the idea of its having a certain bulk and occupying a certain quantity of space. The dimensions of a body are length, breadth and thickness, and all bodies occupying space have these three dimensions. However, at first thought we are liable to attribute only length and breadth to such bodies as a piece of tissue paper or of gold leaf. But this is not correct, for, unless these bodies did possess thickness or depth, they could not exist as material objects.

Ex'tract, a term used to denote all that can be dissolved out of a substance by a specified menstruum, such as water, alcohol or ether. In modern pharmacy the term is applied to two kinds of preparation from vegetables. One is obtained by digesting the plant in water or other solvent and evaporating or distilling away the liquid, until the extracted matter is sufficiently dry. The other is obtained by bruising the plant in a mortar, separating the juice and by successive heatings, filtrations and evaporations getting an extract of the required strength. Extracts must be capable of being redissolved, so as to form a solution like that from which they were derived. Extracts are used in cookery, medicine and the manufacture of perfumery.

Extradition, *ex tra dish'un*, the delivery of a fugitive from justice by one state to another.

Eyck

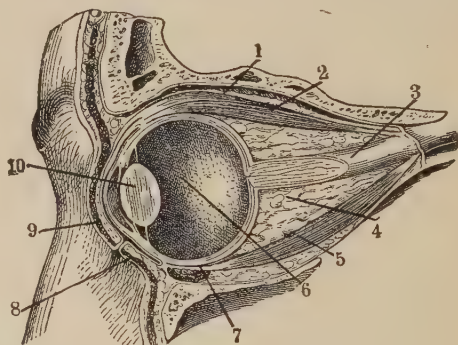
Between nations the matter is usually decided by treaties, specifying the crimes for which extradition is allowed; and usually extradition is neither asked nor granted when no treaty exists. Nations now generally refuse to surrender their own citizens for prosecution by foreign states, and they also decline to extradite political offenders. It has now become the general rule that the criminal who has been extradited cannot be tried except for the offense for which he was extradited. Criminals are extradited from one state to another in the Union, on the demand of the governor of the state from which he has fled.

Eyck, ike, HUBERT VAN (1366–1426) and JAN VAN (1390–1441), brothers, famous painters of the old Flemish school, born at Maaseyck. They lived first at Bruges, whence the younger brother is called John of Bruges, and afterward at Ghent, to which place they removed about 1420. Their fame rests on an invention exceedingly important to modern art, namely, a method of painting in oil, which revived an art that had long been lost. The varnish they used prevented the paint from cracking and enabled them to perfect the full, rich color for which their works are famous. Besides this, they introduced naturalism into art and were the first to paint objects just as they saw them. Jan van Eyck also introduced improvements in linear and aerial perspective and in painting upon glass. The *Adoration of the Lamb*, for the cathedral of Ghent, a painting which, in its different parts, contains above three hundred figures, is a masterpiece. It was in two horizontal divisions, comprising ten panels, of which only the two central ones remain at Ghent, the others being at Berlin. Jan finished the work in 1432 and returned to Bruges, where he remained till his death.

Eye, the organ of sight, in man nearly spherical and about an inch in diameter. It is made up of three coats and three humors. The outer coat, or *sclerotic*, covers about five-sixths of the eye, the front one-sixth being called the *cornea*. The sclerotic coat is a white, thick, tough membrane, which by its firmness gives form to the eyeball, protects the delicate parts and gives attachment to the muscles that move the eye. The *cornea* is transparent and fits into the sclerotic coat as a crystal does into a watch. It has neither blood vessels nor lymphatics. The *choroid coat* lies under the cornea and ends in front with the ciliary processes, beyond which is the *iris*. The choroid contains a large number of nerves, blood vessels and cells of coloring

Eye

matter, which give the dark color to the interior of the eye. The iris is in front of the cornea. It is the visible colored part of the eye and has in the center a round hole, called the *pupil*. The amount of light that enters the eye is regulated by muscles in the iris which make the pupil larger or smaller. When the light is bright the muscle contracts and makes the pupil smaller. For this reason, when a person goes from a brilliantly lighted room into a darker one, he cannot see objects till the pupil dilates and allows more light to enter. The third coat, or *retina*, an expansion of the optic nerve, lies under the



SECTION THROUGH THE LEFT EYE, CLOSED

1, lifting muscle; 2, upper straight muscle; 3, optic nerve; 4, fatty cushion; 5, lower straight muscle; 6, vitreous humor; 7, lower cross muscle; 8, lower eyelid; 9, upper eyelid; 10, crystalline lens.

choroid and terminates near its edge. It is made up of several layers of nervous tissue. The point at which the optic nerve enters the eye forms the *blind spot*, because the nerve fibers here are not sensitive to light.

The humors of the eye are the *vitreous* and *aqueous* humors and the *crystalline lens*. The aqueous humor lies behind the cornea and in front of the crystalline lens. It is a thin, watery fluid, which helps to keep the rounded shape of the front of the eye. The vitreous humor, lying in front of the retina and back of the crystalline lens, is a glassy-looking fluid, about as thick as the white of an egg, and is inclosed in the delicate *hyaloid membrane*. It keeps the eyeball in shape and helps to bend the rays of light to a focus. The crystalline lens, in adults about one-third of an inch long and one-fourth of an inch thick, is inclosed in a capsule, or bag, and lies back of the iris. It looks like clear glass. It is held in place by the *suspensory ligament*, made up in part of the hyaloid membrane and in part of fibers from the ciliary processes. The lens is that part of the eye that does most toward bring-

Eyelids

ing the rays of light to a focus, or point. Six muscles, attached to the sclerotic coat and to the inner part of the orbit, move the eye in the different directions. See **ASTIGMATISM**; **COLOR BLINDNESS**; **EYELIDS**; **HYPERMETROPIA**; **LACHRYMAL GLANDS**; **MYOPIA**; **VISION**.

Eye'lids, the two muscular curtains that can close over the eye and shut out the light. The upper lid has the greater range of motion and in the act of winking spreads the tears over the eyeball to keep it moist. The eyelashes at the edge of the lids prevent particles of dust and other substances from entering the eye. Between the hairs are glands that secrete an oily substance which keeps the eyelids pliable and prevents the tears from running over them, except in crying. The eyelids are lined with a delicate, very sensitive mucous membrane, which is reflected over the front of the eyeball. See **EYE**; **LACHRYMAL GLANDS**.

Eyre, air, **EDWARD JOHN** (1815-1901), an English explorer and colonial governor. He went to Australia in 1833, six years later discovered Lake Torrens and in 1840 explored its eastern shores and the adjacent Flinders Range. He then began his perilous journey along the shores of the Great Australian Bight and reached King George's Sound, over a year after setting out. Made governor of Jamaica, he suppressed a negro insurrection with much severity and was recalled.

Ezra

Eze'kiel (God will strengthen), one of the four greater prophets mentioned in the Old Testament, author of the book that bears his name. He was the son of a priest and was carried away captive by Nebuchadnezzar, when the latter captured Jerusalem, probably about 597 B. C. Ezekiel dwelt by the river Chebar, a branch of the Euphrates, and commenced to prophesy about 592 B. C., continuing for about twenty years. The book of *Ezekiel* is divided naturally into two parts; the first, including chapters I-XXXIX, contains the prophecies delivered before and after the destruction of Jerusalem; the second, chapters XL-XLVIII, contains a vision of Israel restored.

Ez'ra, a celebrated Jewish scribe and priest. Under his guidance the second expedition of the Jews set out from Babylon to Palestine, in the reign of Artaxerxes I, about 458 B. C. The important services rendered by Ezra to his countrymen on that occasion, and also in arranging, and in some measure, it is believed, settling the canon of Scripture, are specially acknowledged by the Jews, and he has even been regarded as the second founder of the nation. Josephus states that he died in Jerusalem; others assert that he returned to Babylon and died there at the age of 120 years. The book of *Ezra* was originally a part of the book of *Nehemiah*.



F, the sixth letter of the English alphabet, the sound of which is formed by pressing the upper teeth on the lower lip and allowing the breath to escape between them. The sound is distinguished from that of *v* by being pronounced with the breath instead of the voice. In form the letter *F* is the same as the ancient Greek digamma, which it also closely resembles in power.

In music, *F* is the fourth note in the major scale of *C*.

Fa'bius, an ancient and renowned family of Rome, who, having undertaken the duty of defending Roman territory against the incursions of the Veientes, established themselves at a post on the river Cremera. They were drawn into an ambush and killed (477 B. C.), with the exception of a boy, who happened to be left in Rome and who became the second founder of the family. Among the celebrated members of the family in later times were Fabius Maximus, whose policy of defensive warfare was so successful against Hannibal in the second Punic War, and Fabius Pictor, who lived about the same time and was the earliest Roman historian.

Fa'ble, in literature, a term applied originally to every imaginative tale, but confined in modern use to short stories, either in prose or verse, in which animals and sometimes inanimate things are made to act and speak with human interests and passions, for the purpose of pointing a moral. The fable consists properly of two parts—the symbolical representation, and the application, or moral, which must be apparent in the fable itself. The oldest fables are supposed to be the Oriental, and among these the Indian fables of Pilpai, or Bidpai, and the fables of the Arabian Lokman, are celebrated. Among the Greeks, Aesop was the master of a simple but very effective style of fable. The fables of Phaedrus are a second-rate Latin version of those of Aesop. In modern times Gellert and Lessing among the Germans, Gay among the

English and Kryloff among the Russians are celebrated; but the first place among modern fabulists belongs to the French writer La Fontaine.

Facade, *ja sad'* or *ja sade'*, the face or front of a building viewed from without. It usually contains the principal entrance. When applied to the faces other than the front of a building, it is used with a qualifying term, as *rear facade*, *lateral facade*, *court facade*.

Face, *fase*, **THE**, the front part of the head, including the forehead, eyes, nose, mouth, cheeks and chin. Exclusive of the thirty-two teeth, it is composed of fourteen bones, all but two of which, the lower jaw, or *inframaxilla*, and the *vomer*, which separates the nostrils, occur in pairs. The two bones of the upper jaw carry the upper teeth and form most of the hard palate separating the mouth from the nose. The two *palate* bones complete the hard palate. The two *malars* are the cheek bones. The two *nasal* bones form the bridge of the nose. The two *lachrymals*, or *tear bones*, lie between the eye socket and the nose. The two *turbinated* bones form the outer wall of the nostrils. Of all these bones the lower jaw only is movable, being articulated with the base of the skull. In brutes the jaws project much more than in men and form the prominent feature of the face, while the forehead recedes. See **SKELETON**.

Faces, **FALSE**, pasteboard or cloth masks, representing human faces, usually with distorted features. They are made as follows: The sculptor or modeler, with his moist modeling clay, forms in high relief half a face, with conventional features. This is done in order that he may arrive at the proper proportions and distances; but as soon as the regular features are made he begins to distort them. A wad of clay is put on to the end of the nose, and a twist, punch or pull transforms it into whatever shape he desires. The chin, mouth, cheeks, lips and forehead are changed to suit. The modeler is careful to form his model so that

there will be no undercuts, or surfaces that curve under, for a hollow plaster of Paris cast is made of the model, and this cast is the mold in which the pasteboard false face is made. If the model has undercuts, the pasteboard cannot be drawn from the mold. The mold, or hollow cast, is made by pouring plaster of Paris, mixed with water, over the face of the model. The workman who does this first dashes the thin plaster into the cracks and crevices of the face and then fills the mold up until it is one to two inches thick. When the plaster is set, it is taken from the clay model and is ready for the workmen who make the pasteboard faces. The pasteboard is soaked in water until it is soft and mushy. In this condition it will conform to every curve and mark in the plaster mold. The first layer is pressed into the mold with the fingers, great care being taken to cover completely every bit of the surface. When this layer of pasteboard is pressed into shape, another is laid on, and thus the face is built of successive layers. Flour paste is used to hold the layers of paper together. After the faces are dried, they are daubed with paint, and the hair, mustache and whiskers are glued in their proper positions. See MASKS.

Facial Neuralgia, *fa'sh'l nu ral'je ah*. See TIC DOULOUREUX.

Fac'tor. See AGENT.

Factor, in arithmetic, the multiplier and multiplicand, from the multiplication of which proceeds the product; thus, 7 and 4 are factors of 28. Any one of the several quantities which multiplied together will produce a given number is a factor of that number. In algebra, any expression which is considered as part of a product is a factor.

Fac'tory and Factory Legisla'tion. A factory in its modern sense is an establishment in which several persons coöperate to produce a commodity, the process of manufacture being divided into several stages, each of which is the special work of a separate class of laborers. The development of the factory system has its foundation in the principle, which is now well established, that economy of time, effort and financial expense and an advantage in the quality of production arise when several coöperate in the production of a complex article. The factory system first began to be important about the middle of the eighteenth century in England, when the inventions of Arkwright, Cartwright, Hargreaves and others led to the substitution of large and heavy machinery

for hand labor with the small, simple tools which had been used previously. The system received a great impetus from the invention of steam power, which again increased the speed with which an article could be produced, caused a saving of labor and money and admitted of the establishment of manufacturing plants wherever conditions were most favorable. The next important step was the improvement in transportation facilities, and the last was the development of the patent system, by which the labors of inventors were protected and preserved to themselves, and the institution of labor-saving machinery was no longer opposed or its inventors persecuted.

The factory system was introduced into the United States about 1790 by Samuel Slater, but its development was slow until 1840. After that time, as population increased, the tendency to concentration of population increased, and the natural consequence was a development of coöperative effort in manufactures. This was vastly hastened by the development of electrical appliances. The benefits of the factory system have been enormous. The division of labor has resulted in a vast improvement in the quality of the article, in a great saving of time and, therefore, the lessening of price; this has led to an increased demand, which, in turn, has improved the demand for labor, raised wages, the standard of living and the general condition of working people. Its evils have been also numerous, but are less important than is usually believed. Women and children have doubtless been employed in greater numbers under the factory system than before; but their employment did by no means begin with the institution of the factory system. Insanitary conditions prevail in many factories; but they are not to be compared in their evil results with the conditions prevailing in sweatshops and tenement houses, where manufactures are carried on. The great subdivision of labor perhaps requires a somewhat lower grade of intelligence, since each worker is required to understand but a small part of the whole process of manufacture. However, the development of machinery has made necessary a deftness of movement and an alertness of mind which were never before required, and the gathering of many workmen together, with the consequent discussion of their needs and conditions, has stimulated the minds and raised the ideals of the workmen as a class. Perhaps the most important result of the factory system has been the widening of the gulf between

capital and labor, since under the old household system of manufacture the capitalist was also the laborer, while under the new order, the two factors of production are not only centered in different persons, but their interests are necessarily growing farther and farther apart. It also causes the distinction between skilled and unskilled labor to be emphasized, to the benefit of the skilled workman and to the disadvantage of the unskilled workman. This probably causes the raising of the average of skill, since it leads many unskilled workmen to make effort to enter the classes above them.

Side by side with the development of the factory system has been the development of labor legislation, most of which in both England and America has been directed to the improvement of the sanitary conditions of work and the protection of the health of the workers in factories. This legislation has taken chiefly three directions: (1) the limitation of child and female labor, (2) the restriction of the hours of labor and (3) the improvement of the conditions of factory work. Most states now prohibit child labor, the age limit being placed variously at from ten to fourteen years. Many states limit, and some prohibit, work by adult women in factories or mines, and a vast majority now limit the hours of work, the average maximum probably being from fifty-five to sixty hours per week. Trades unions have played an important part in securing these reforms and are now devoting their energies to the universal passage of laws limiting the hours of labor to eight in one day. Their efforts have also aided in the accomplishment of another important reform, namely, the increase of the liability of employers for accidents to their workmen. All of these laws have required for their successful enforcement the institution of inspection systems. Inspection is now carried on in almost all states, with a view to bringing to court violators of factory laws. See SWEATSHOP SYSTEM; DIVISION OF LABOR; LABOR ORGANIZATIONS; MASTER AND SERVANT.

Fag'ging, a term used in English public schools to denote the services which boys in the lower classes are considered to owe to those in the upper classes. These consist largely in attendance at games and in the performance of personal service for certain upper class boys, to whom they have been especially assigned. A good idea of the custom may be found in Hughes's *Tom Brown's School Days*.

Fahrenheit, *fah'ren hite*, GABRIEL DANIEL (1686-1736), a German physicist, born at Dantzic and known for his arrangement of the thermometer. Abandoning the commercial profession which he first followed, he settled in Holland to study natural philosophy. In 1720 he effected a great improvement in thermometers, by the use of quicksilver instead of spirits of wine. He invented the Fahrenheit scale and made several valuable discoveries in physics. See THERMOMETER.

Faience, *fa ahNs'*, imitation porcelain, a kind of fine pottery, superior to the common pottery in its glazing, beauty of form and richness of painting. It derived its name from the town of Faenza, in Italy, where a fine sort of pottery, called *majolica*, was manufactured as early as the fourteenth century. The modern faience appears to have been invented about the middle of the sixteenth century, at Faenza, as an imitation of majolica. True faience is made of a yellowish earth, covered with an enamel which is usually white, but may be colored. See MAJOLICA; POTTERY.

Faint'ing or **Syncope**, *sin'ko pe*, a sudden suspension of the heart's action, of sensation and of the power of motion. It may be produced by loss of blood, pain, emotional disturbance or by organic or other diseases of the heart. A person fainting should be laid upon the back, with his head and shoulders slightly lower than his body, and his clothing should be loosened wherever it impedes circulation. Cold water may be sprinkled on the face and stimulating odors applied to the nostrils. Protracted cases need the advice and treatment of a physician.

Fair'bairn, WILLIAM, Sir (1789-1874), a British civil engineer, born at Kelso, Roxburghshire. He was apprenticed to a machinist at a colliery in North Shields and commenced business on his own account in 1817 with a Mr. Lillie, in Manchester, where he made many improvements in machinery, such as the use of iron instead of wood in the shafting of cotton mills. About 1831, his attention having been attracted to the use of iron as a material for ship-building, he built the first iron ship. His firm became extensively employed in iron ship-building at Manchester and at Millwall, London, and had a great share in the development of the trade. Fairbairn shares with Stephenson the distinction of building the great tubular bridge across the Menai Strait, and he built more than a hundred bridges upon this principle. He was president of the British Association for the

Advancement of Science in 1861 and later was made a baronet.

Fairbanks, CHARLES WARREN (1852-), an American statesman, born on a farm in Ohio, educated at Ohio Wesleyan University and admitted to the bar in 1874. He practiced law for a number of years in Indianapolis and in 1897 was elected United States senator from Indiana and was reelected in 1903. In 1898 he was a member of the British-American joint high commission and chairman of the American commissioners. In 1904 he was elected vice-president of the United States on the Republican ticket, and served one term.

Fairbanks, THADDEUS (1796-1886), an American inventor, born at Brimfield, Mass. When a young man he removed to Saint Johnsbury, Vt., and entered into partnership with his brother, in the manufacture of stoves, plows and other iron implements. His first skill as an inventor was made known through the invention of a stove, which was much more convenient and useful than any pattern that had preceded it. He also patented a cast iron plow that was considerably in advance of other implements of the sort; but his fame rests on the invention of the platform scale, which so completely met universal demand for weighing heavy commodities that the company gave their entire attention to the manufacture of this and other scales of numerous patterns, most of which were invented by Mr. Fairbanks. At the time of his death he was at the head of the largest scale manufactory in the world. His scales found use in every civilized country, and in recognition of the benefit which he had conferred upon commerce, numerous ranks and titles were bestowed upon him and he was the recipient of medals from many foreign lands. He was the founder of Saint Johnsbury Academy, which he liberally endowed.

Fairchild, JAMES HARRIS (1817-1902), an American educator and clergyman, born at Stockbridge, Mass., and educated at Oberlin College, being a member of the first class that entered the institution. Later he became professor of Latin and Greek at Oberlin, and in 1867 he was chosen president of the college, which position he held for 22 years. He exhibited great ability as an organizer and educator, and during his presidency of the college its influence was greatly strengthened and its work broadened.

Fairchild, LUCIUS (1831-1896), an American soldier, born at Franklin Mills, Ohio. At the age of fifteen he moved to Madison, Wis., and from 1849 to 1855 lived in California. Return-

ing to Wisconsin, he studied law and was admitted to the bar in 1860. In 1861 he was made captain in a Wisconsin regiment and became colonel and later captain in the regular army. At Bull Run he commanded the famous "iron brigade," and at Gettysburg led a charge at Seminary Ridge, where he was severely wounded. In the same year he was commissioned brigadier general of volunteers, but resigned. Afterward he was governor of Wisconsin for three terms, later entered the consular service, serving at Liverpool and Paris, and was minister to Spain from 1880 to 1882. He was in 1886 commander in chief of the Grand Army of the Republic.

Fairfax, THOMAS (1612-1671), a British commander during the war between Charles I and Parliament. In this struggle he served as cavalry officer in the Parliamentary army and first distinguished himself at Marston Moor. Later he was for a time commanding general of all the Parliamentary forces, and the victory at Naseby was due in large measure to him. Because Fairfax would not march against the Scotch when they proclaimed Charles II king, Cromwell was made commander in chief in his stead and Fairfax withdrew from the army. During Richard Cromwell's short rule Fairfax was a member of Parliament, and he was one of the delegates who conferred with Charles II. He wrote a history of the civil war.

Fairfield, IOWA, a city and the county-seat of Jefferson co., on the Chicago, Rock Island & Pacific and the Chicago, Burlington and Quincy railroads, 50 mi. w. n. w. of Burlington. Parsons College is located here. The city has manufactures of wagons, furniture and agricultural implements. Population in 1910, about 5000.

Fairhaven, WASH., a former city in Whatcom co. It was united with the city of Whatcom in 1903 to form Bellingham. See BELLINGHAM.

Fairies, the small folk familiarly spoken of everywhere, though known among different people by various names. They are usually represented as of small and graceful human shape, although they may appear in any form they choose. Among almost all peoples there is a classification of fairies into good and evil spirits, the good spirits inhabiting the air and the evil ones dwelling underground. In northern Europe the fairies are divided into two races: the *elves*, graceful, sportive fairies who dance about the woods and often take a beneficent interest in the affairs of human beings; and the *dwarfs*, or *gnomes*, who dwell underground and

are the guardians of the jewels and metals hidden in the earth. They are for the most part somewhat malicious spirits, although their cleverness and their ability to forge wonderful weapons make them of great use to mankind if they can be induced to be favorable. A part of the dwarfs, known as *trolls*, live in the hills and often emerge to steal from men not only personal property, but women and children. These little beings are regarded, not as immortal, but as living for a very long period.

Besides these spirits which inhabit the earth, there is supposed to be, by most northern nations, a class of *nixies*, water spirits, who, though not distinctly malicious, are very fond of enticing men or carrying them off by force to their caves in the sea. Among these nixies the most famous was the Lorelei, who from her cliff on the Rhine lured sailors to death by her beauty and the sweetness of her song. *Undines*, a sort of water spirits, are supposed to enter sometimes into various relations with human beings. If an undine marries a mortal and bears a child, she receives a soul. In Ireland, *pixies* are certain small beings into whom enter the souls of children who die unbaptized. In Ireland, too, as in Scotland, there is a belief in *banshees*, little old women who take up their abode in all houses of any importance and announce the death of a member of a family by wailing or by appearing in mortal form. Perhaps the most perfect ideal of the fairy type is the Persian *peri*, who lives upon perfume and tries by loving deeds to win an entrance to paradise, from which she is shut out by her lack of a soul.

Of course each nation adapts its fairies somewhat to its own customs. Thus, the Russian fairy is regarded as clad always in furs; the Chinese fairy wears a queue, and the Hindoo fairy has the wisdom of the Brahmins. English fairies are thought of chiefly in connection with the flowery fields and woods, about which they are supposed to dance on summer nights. Shakespeare's *Midsummer Night's Dream* gives a vivid idea of some of the more common fairy myths in England.

The origin of these creatures of the imagination is probably similar to that of all myths. Every phase of nature which demands accounting for is explained as the manifestation of some supernatural being. As education increases, the belief in fairies of course diminishes, but among the uneducated peasant classes the belief is still strong in most countries. There is a large literature of fairy tales, among the best of which are

Hans Christian Andersen's and Grimm's *Fairy Tales*. These, of course, deal not only with fairies but with all sorts of supernatural beings and treat often of everyday objects as if they were possessed of intelligence and the power of speech.

Fair'mont, W. VA., the county-seat of Marion co., 77 mi. s. e. of Wheeling, on the Monongahela River and on the Baltimore & Ohio and other railroads. A state normal school is located here, and the city has a fine courthouse. There are extensive coal mines, and the other important industrial establishments include flour mills, foundries, planing mills, machine shops, glass works and cigar factories. Population in 1910, 9711.

Fair Oaks, BATTLE OF, an important battle of the Civil War, fought during the Peninsula Campaign (See PENINSULA CAMPAIGN), about seven miles east of Richmond, Va., on May 31 and June 1, 1862, between a force of about 42,000 Federals, from the Army of the Potomac under General McClellan, and about an equal force of Confederates, under generals Joseph E. Johnston and G. W. Smith. After Johnston's retreat from Williamsburg toward Richmond, McClellan followed him leisurely, and upon reaching the Chickahominy River sent two corps of his army under Keyes and Heintzelman to the south side of the stream. Johnston immediately decided to attack this force before it could be reinforced or could recross the river. The attack was begun May 31 about 1 p. m. by General Longstreet, who drove Keyes's troops from their position back toward the Chickahominy. McClellan ordered a force under General Sedgwick and Sumner to cross the river in order to relieve General Keyes. This force engaged part of General Smith's Confederate command near Fair Oaks Station and was compelled to fight desperately for several hours to maintain its position. It was at this point that General Johnston was severely wounded; his command fell first upon General Smith and later upon General Lee, who thereafter was head of the Army of Northern Virginia. About the middle of the following day, the battle having raged since morning, General Lee withdrew toward Richmond. The loss of the Confederates was about 5200; of the Federals, slightly less.

Fairs, periodical meetings of persons having goods or wares for sale, held in an open market at a central location, generally for the transaction of a particular class of business. In the

Fairweather

Middle Ages fairs were of great importance and were specially privileged and chartered by princes and magistrates, public proclamation being made of their commencement and duration. But modern facilities for communication have much diminished the necessity for periodical markets, and it is now chiefly among agriculturists that they are of much importance. In Europe the most important fairs of the present day are those at Leipzig and Frankfort-on-the-Main in Germany, at Lyons in France and at Nijai-Novgorod in Russia. The latter is, indeed, the largest fair in the world. Fairs in the sense of markets are almost unknown in the United States, but the term is usually given to bazaars or collections of the products of art or industry for public exhibition and competition. They are usually combined with amusement features.

Fair'weather, MOUNT, on the west coast of North America, in Alaska. Its height is uncertain, but is supposed to be approximately 14,900 feet. Its summit is crowned with perpetual snow.



CARDINAL FALCONIO

Fakirs, *fa'kurz* or *fa keerz'*, (poor men), fanatics, met with chiefly in India and the neighboring countries, who retire from the world and give themselves up to contemplation. They are properly of the Mohammedan religion, but the term is often used for a mendicant of any faith. They are found living both in communities and in solitude. The wandering fakirs gain the

Falkland Islands

reverence of the lower classes by absurd penances and self-mutilations.

Falcon, *jav'k'n*, strictly, the name of a hawk famous for its strength, symmetry and remarkable



GREENLAND FALCON

power of flight. Its claws are sharp and hooked, its short, stout legs are heavily feathered and its curved beak is armed with a sharp point. The peregrine falcon was the one most used in hunting game (See **FALCONRY**), but there are several other species that are almost equally powerful and graceful.

The Greenland falcon is one of the best-known.

Falconio, **DIOMEDE** (1842-), an American Roman Catholic cardinal. Although born in Italy, he came to the United States at the age of twenty and nearly his entire life has been spent here. This fact entitles him to recognition by his Church as an American. He was ordained priest in Buffalo in 1866, went in 1871 to Newfoundland, where he remained ten years. After that time he spent a few years in Italy in prominent positions in the Church, but in 1899 he was appointed by the pope first apostolic candidate to Canada, from which place he was transferred to Washington in a similar capacity in 1902. On November 27, 1911, Monsignor Falconio and Archbishops Farley and O'Connell were named by the pope as American cardinals.

Falconry or **Hawk'ing**, the pursuit of game by means of trained falcons or hawks. Falconry is a very old amusement in Europe and Asia. In the Middle Ages it was the favorite sport of princes and nobles; and, as ladies could engage in it, it became very prevalent. In Germany Henry the Fowler and the Emperor Frederick the Second were much addicted to this sport, the latter having written a work on falconry. In France it reached its height under Francis I, whose grand falconer had under him an establishment of fifteen nobles and fifteen falconers, costing annually about 40,000 livres. In Britain it was practiced among the Anglo-Saxons, but grew still more in favor after the Norman Conquest.

Falkland, *fawk'land*, **Islands**, an island group belonging to Great Britain, in the South

Atlantic Ocean, about 300 mi. e. of the Straits of Magellan. The group consists of two large islands, East Falkland and West Falkland, covering respectively about 3000 and 2300 sq. mi., and a great number of smaller ones surrounding them. The total area is about 7500 square miles. They are hilly and boggy, entirely destitute of trees, but covered with a variety of grasses very nutritive for sheep and cattle, the rearing of which is the principal industry. Fish and sea fowl abound. Wool, frozen meat, hides and tallow are the chief exports. The Falkland Islands were discovered by Davis in 1592. Settlements were afterward formed on them by the French, Spaniards and English, alternately, but the latter retained possession of them. The colony has a governor and other officers appointed by the crown. Port Stanley, in East Falkland, is a thriving settlement. Population of the islands in 1911, 2272.

Fallacy, *fal'las sy*, in logic, a fault in the form of reasoning, which leads to a wrong conclusion. The term is also applied to faults in the substance of an argument, such as proving one proposition by assuming another which is identical with it. Fallacies are of two kinds, deductive and inductive. Some of the most common deductive fallacies are the following:

(1) The fallacy in which the argument is turned from the merits of the case to the character of the opposition of one's opponent. This form of arguing is often practiced by attorneys.

(2) The fallacy of appealing to the passion or prejudice of an audience, rather than to their reason. This fallacy is the resort of the demagogue.

(3) The fallacy which consists in taking advantage of a person's ignorance and consequent lack of power of discrimination between the true and the false. This is resorted to by attorneys and agents.

(4) The fallacy of appealing to the sentiment of veneration for authority, instead of appealing directly to reason. Some persons place great weight upon names of eminent men and use these as a convincing argument, while from the logical point of view they are no argument at all.

Inductive fallacies are due to errors in observation, errors in judgment, errors of the imagination and errors in the reasoning process. For a fuller explanation of these, see CONCEPT; INDUCTIVE METHOD.

Fallieres, *fah lyair'*, CLEMENT ARMAND (1841-), a French statesman, president of

the French Republic. His political career began in 1876, when he was elected to the national Chamber of Deputies. He served in succession as minister of the interior, minister of public instruction and minister of justice. In 1890 he was elected to the Senate, of which he became president when Loubet was elected president of the Republic. His election to the presidency took place in 1906; his term ended in 1913.

Fall'ing Bod'ies. Because of the attraction of gravity, all bodies when unsupported fall toward the center of the earth. A ball held in the hand presses downward; if dropped it descends in a perpendicular line; if placed on an inclined plane, it rolls down. In the air, bodies fall with unequal velocities; for instance, a piece of paper falls more slowly than a bullet, but this is because of the peculiar shape of the bodies, that of the paper being such as to receive much resistance from the air, while the bullet receives comparatively none. If a feather and a bullet or a piece of paper and a bullet are placed in a long glass tube, from which the air has been taken, they will fall with an equal velocity.

Falling bodies are subject to the laws of gravity. These are as follows:

(1) Gravity imparts to a falling body an acceleration of 32.16 feet, or 980 centimeters, per second.

(2) The distance a body falls in a second under the influence of gravity is one-half the acquired acceleration, or 16.08 feet, or 490 centimeters; therefore this is the distance which a body falls the first second. In the second second it falls 32.16 feet, or 980 centimeters, from its acquired acceleration, and 16.08 feet, or 490 centimeters, additional to the acceleration of gravity; during the second second, therefore, it falls 48.24 feet, or 1470 centimeters, in all, and during the two seconds it falls four times 16.08 feet; that is, 64.32 feet, or 1960 centimeters. When a body is thrown upward, these laws apply in reverse order.

From the foregoing laws the following rules in regard to falling bodies are obtained:

(1) To find the distance a body falls in a given number of seconds, multiply the distance it falls in the first second by the square of the number of seconds. In three seconds a body will fall nine times 16.08 feet; that is, 144.72 feet, or 4410 centimeters.

(2) To find the distance a body falls in any given second, multiply the distance it falls the first second by twice the number of seconds

less 1. To find the distance a body falls in the fourth second, multiply 16.08 feet, or 490 centimeters, by 7; the distance is 112.56 feet, or 3430 centimeters.

(3) To find the velocity of a falling body at the end of any given second, multiply 32.2 feet, or 980 centimeters, by the number corresponding to the second. To find the velocity of a falling body at the end of the third second, multiply 32.16 feet, or 980 centimeters, by 3. The velocity is 96.48 feet, or 2940 centimeters per second.

Fallow Deer, a common European deer, found also in northern Africa. It is smaller than the stag and is of a brownish color, with white beneath, on the insides of the limbs and beneath the tail. The horns, which are peculiar to the male, are very different from those of the stag; they are not branched, but are broader and more spreading. The flesh of the fallow deer is considered the most savory of venison. See **DEER**.

Fallows, SAMUEL (1835-), an American clergyman and educator, born at Pendleton, England. He came to America in 1848, settling in Wisconsin, graduated from the University of Wisconsin. He entered the Civil War as chaplain of a Wisconsin regiment, was promoted and left the service as a brigadier general in 1865. For three years he was state superintendent of public instruction of Wisconsin and later was president of Illinois Wesleyan University. In 1875 he became rector of St. Paul's Reformed Episcopal Church in Chicago, and in the following year he was made bishop. Bishop Fallows also held numerous positions of trust and honor in associations and movements of national importance. His theory that nervous diseases might be cured through mental suggestion attracted world wide attention and won many adherents.

Fall River, MASS., an important manufacturing city of Bristol co., situated on the Taunton

River at its mouth, on Mount Hope Bay, 50 mi. s. of Boston and on the New York, New Haven & Hartford Railroad. It is also connected with New York, Philadelphia and Newport by lines of steamers. The city is about eleven miles long and has an area of 41 square miles. It is well laid out and has a number of public parks and pleasant drives. Among the notable buildings are the B. M. C. Durfee High School, the state armory, the postoffice and custom house, the city hall, Bradford Durfee Textile School, Central Congregational Church, Church of the Ascension, Saint Mary's Pro-Cathedral, Notre Dame Church, Saint Anne's Church and the public library, which has a collection of over 80,000 volumes. The leading educational institutions of the city are the Bradford Durfee Textile School, Thibodeau's Commercial College, the Rogers and Allen's School and Notre Dame College. The charitable institutions include a Home for Aged People, Children's Home, Saint Vincent's Home and Saint Joseph's Home.

Fall River is one of the leading industrial cities in the United States. Fall River furnishes an abundance of water power. The most important industries are those connected with the manufacture of cotton goods. The mills have over 3,400,000 spindles and 86,000 looms. There are also important manufactures of woolen goods, men's hats, knit goods, boots and shoes, spools and bobbins and foundry and machine shop products. The city has extensive bleaching works, carriage factories, rope and twine works and breweries, and there is an important quarry near. Fall River was formerly a part of Freetown, but was incorporated under its present name in 1803 and was chartered as a city in 1854. Population in 1910, 119,295.

False Pretenses, in law, false representations and statements, made with a design to obtain "money, goods, wares and merchandise," with intent to cheat. At common law it is a misdemeanor.

Familiar Spirits, demons, or evil spirits, supposed to be continually within call and at the service of their masters. Sometimes they assume shape, sometimes are attached to a magical ring or the like, sometimes are compelled by magic skill and sometimes do voluntary service. We find traces of this belief in all ages and countries, under various forms.

Famine, a dire want of food, affecting considerable numbers of people at the same time. Irregular rainfalls in tropical climates, imperfect methods of irrigation or the too exclusive depend-

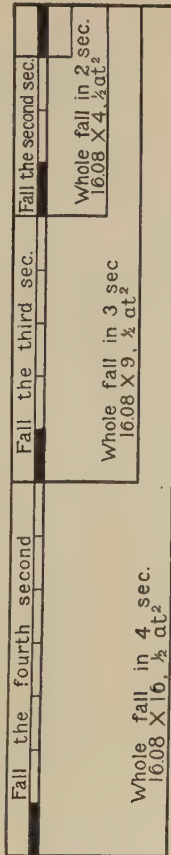


DIAGRAM ILLUSTRATING LAWS OF FALLING BODIES

ence of the mass of people on a single article of food, which happens to fail, are among the commonest causes of famines. In the early and mediæval ages they were frequent; but the rapidity of modern communication and transport has made the rigor of famine almost impossible in Europe. India has long been the seat of terrific famines; but of late the British officials have been very active in organizing relief measures. Among the more recent famines are the one in Northwest India (1837-1838), in which about 800,000 perished; that in Bengal and Orissa (1865-1866), when about 1,000,000 perished; and that in Bombay, Madras and Mysore (1877), in which about 500,000 died. In China a great famine took place in 1877-1878, in which over 9,000,000 are said to have perished, and another occurred in 1888-1889, owing to the overflow of the Yellow River. In Russia, in 1891, a vast number of people suffered and many died. In India, again, in 1900, fully 1,000,000 people starved, and in China, in 1902, probably more than this number died as the result of a famine.

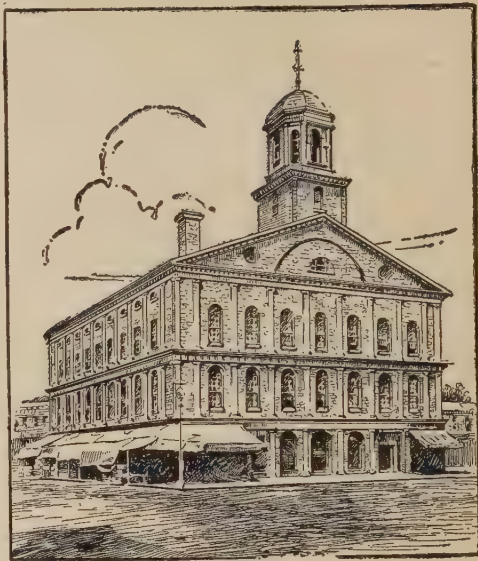
Fancy, *fan'sy*, a term approaching imagination in meaning. In its general acceptation it refers both to the forms of the imagination and to the mental faculty which produces them; but it is used frequently for the lighter or more fantastic forms of the imagination.

Fandan'go, an old Spanish dance, which probably originated with the Moors in Andalusia. It is seldom danced except at the theater and in the parties of the lower classes. It is danced by two persons only, who never touch so much as each other's hands, though the motions of the dancers are often improperly suggestive.

Faneuil, fan'el, Hall, a public building in Boston, built by Peter Faneuil in 1742, as a gift to the town, comprising, originally, a market house and a townhall, with other rooms. It was burned in 1761, rebuilt in 1763 and enlarged in 1805. The hall is famous as the place where stirring speeches were made and political meetings held at the outbreak of the Revolutionary War, whence it derived the name of "Cradle of American Liberty." It was here, in 1773, that an immense public meeting was held, at which the "Boston Tea Party" was organized. Wendell Phillips made his first anti-slavery speech in this building, in 1837, at a memorial meeting in honor of Elijah Lovejoy, killed by a mob at Alton, Ill.

Fan Palm, *pahm*, a name quite generally

applied to those species of palms which have broad, fan-like leaves. See **PALMS**.



FANEUIL HALL

Far'aday, MICHAEL (1791-1867), one of the greatest of English chemists and physicists, born in humble circumstances at Newington Butts, near London. Sir Humphry Davy appointed him his assistant at the Royal Institution, and in 1829 he became lecturer at the Royal Military Academy at Woolwich. It was while in the chair of chemistry at the Royal Institution that he made most of his great electrical discoveries, which confirmed him in his position as one of the most successful experimenters ever known in physics. In 1832 he received the honorary degree of D.C.L. from Oxford and was made an honorary member of the Academy at Berlin. In 1835 he received a pension of \$1500 a year from Lord Melbourne. Among his published works were the following: *Researches in Electricity*, *Lectures on Non-metallic Elements*, *Lectures on the Forces of Matter* and *Lectures on the Chemical History of a Candle*.

Farallones, *fah ra lohnz'*, a group of small islands in the Pacific, about 30 mi. from the entrance to the Bay of San Francisco.

Farce, *fahrs*, a form of the drama which differs from comedy by being more extravagant and ludicrous. Any form of absurdity or improbability is allowable, provided only that it provokes laughter. Originally the farce was considered merely as comedy in a somewhat exaggerated degree, but in the eighteenth cen-

ture it came to be regarded as a distinct form of drama.

Far Eastern Question, the name used to indicate the problem of international politics growing out of the development of the interests of western powers in Asia, especially in those countries bordering upon the Pacific. The problem has assumed especial importance within the last quarter of the nineteenth century, when the Chinese Empire seemed on the point of a rapid decline and thus appeared to be an easy prey to the commercial nations of Europe. China's weakness was further revealed by its war with Japan in 1894 and 1895, which resulted in a complete victory for the island empire. It was then, also, that Russia and Germany intervened, to prevent Japan from reaping the full fruits of its victory, and at the same time to secure for themselves commercial posts and coaling stations, from which to extend their spheres of influence in the East. The unexpected entrance of the United States into the affairs of Asia was the result of the Spanish-American War, which threw into its hands the control of the Philippines. The influence of America, however, was clearly shown at the close of the Boxer Rebellion in 1900, when by astute diplomacy on the part of the United States government, the interested nations promised to maintain the so-called "open door" policy in China. At the present time Japan is in possession of Korea and southern Manchuria; Russia maintains a more or less firm control of northern Manchuria; Germany has important concessions in the Shan-tung Peninsula and in the rich Hoang-ho region; Great Britain has Hong Kong and Wei-hai-wei in the neighborhood of the Yang-tse-Kiang; France is in the southern part of China and is practically allied with Russia as regards eastern diplomacy; the United States, in the Philippines, supported by Great Britain and Japan, is attempting to maintain the open door, with the forced consent and approval of the other nations. It seems to be only a matter of time before the Far Eastern Question, now the most important problem of international diplomacy, will cause a world contest and a readjustment of the rank of nations.

Fargo, *fahr'go*, N. D., the county-seat of Cass co., is situated on the Red River of the North, 250 mi. n. w. of Minneapolis, Minn., and on the Northern Pacific, the Great Northern and a branch of the Chicago, Milwaukee & Saint Paul railroads. It is directly across the river from

Moorhead, Minn., with which it is connected by an electric railway. The city is an important grain market and also has a large trade in agricultural implements. Fargo is the seat of the state agricultural college and of the Fargo College (Congregational), and is the see city of the Catholic diocese of Fargo and of the Episcopal diocese of North Dakota. Population in 1910, 14,331.

Fargus, *fahr'gus*, FREDERICK JOHN (1847-1885), an English novelist, best known by his pseudonym, Hugh Conway. The work for which he is remembered is *Called Back*, a sensational novel published in 1884, of which half a million copies were sold.

Faribault, *fair'i bo*, MINN., the county seat of Rice co., 52 mi. s. of Saint Paul, at the junction of the Straight and Cannon rivers and on the Chicago & Great Western, the Rock Island, the Chicago, Milwaukee & Saint Paul and other railroads. The city is beautifully located in a region having many lakes. Here are the Shattuck School for Boys, Saint Mary's School for Girls, Bethlehem Academy for Girls and the Seaburg Divinity School; also the state schools for the blind, the deaf and dumb and the feeble-minded. Faribault was settled about 1850. Population in 1910, 9001.

Farinelli, *fah're nell'y*, CARLO (1705-1782), an Italian singer whose real name was Broschi. In early childhood he attracted the attention of musicians in Italy and soon aroused the greatest enthusiasm by his remarkable soprano voice. Traveling through Austria and Germany he received a continuous ovation, and in Spain he long held a position of peculiar influence at court. He was banished by Charles III in 1759 and died in his own beautiful palace at Bologna. He possessed probably the most remarkable male soprano voice ever known, both as to range and quality.

Farini, *fa're'ne*, LUIGI CARLO (1812-1866), a celebrated Italian statesman and historian, born at Russi, near Ravenna, Italy. He graduated at the University of Bologna and began the practice of medicine, but his part in the early revolutionary movements of 1840-1850 compelled him to leave Italy. Under the liberal administration of the latter part of this period he held positions of responsibility and later retired to Piedmont, where he devoted himself to writing in the interests of the liberal movement headed by Cavour. During this time he also wrote a history, *The Roman State from 1814 to 1850*, which is the work on which his fame chiefly rests.

Farjeon

In 1860 he labored earnestly in Parma, Bologna and Florence in favor of the unification schemes of Victor Emmanuel, and in the same year he became minister of the interior. Soon afterward his health failed and he died. He probably exerted an influence second only to that of Garibaldi and Cavour in favor of a united Italy.

Farjeon, *fahr'jon*, BENJAMIN LEOPOLD (about 1836–1903), an English author. He was born in London, but went while quite young to the gold diggings in Australia and later removed to New Zealand. His first book was *Shadows on the Snow*, but the first one which met with success was *Grif*, published after his return to London. Among his other books are *Joshua Marvel*, *The House of the White Shadows* and *The Mesmerists*. Farjeon made a tour of the United States in 1877, giving readings from *Blade-o'-Grass*.

Farley, *fahr'ly*, JOHN MURPHY (1842–), an American Roman Catholic cardinal, born



JOHN MURPHY FARLEY

in Newton Hamilton, Maragh County, Ireland. He was educated in Ireland and at Saint Joseph's Seminary in Troy, N. Y. He also studied four years in the American College at Rome, where he was ordained priest in 1870. He immediately returned to America, but in 1884 became private chamberlain to Pope Leo XIII. Seven years later he was made vicar-general of the archdiocese of New York. In 1895 he was auxiliary

Farnese Palace

bishop of New York, in 1902 became archbishop, and in 1911 cardinal. He is the author of several controversial and historical works.

Farmers' Alliance. See POPULIST PARTY.

Farmers' Institute, a meeting for instruction and mutual benefit of farmers. As ordinarily conducted, a farmers' institute consists of a three or four days' meeting, which is planned to reach the farmers of several adjoining towns. The meeting is usually conducted by one or more men who are experts in certain lines of agricultural work. The conductors arrange the program, give talks on their specialties and invite general discussion from the farmers present. The evenings are usually devoted to popular lectures, and the exercises are interspersed with music. In most states farmers' institutes are managed by the state board of agriculture, who employ a superintendent, whose business it is to organize the institutes, conduct or visit them as far as possible and see that the programs are beneficial to the farmers. The farmers' institute plan originated with the state agricultural colleges and is the means of disseminating much valuable information.

Farm'ing. See AGRICULTURE.

Farne, *fahn*, **Islands** or **Fern**, *furn*, **Islands**, a group of islets belonging to Great Britain, in the German Ocean, off the north coast of Northumberland, 2 mi. e. by s. of Bamborough Castle. They have been the scene of several disastrous shipwrecks. These islands are the scene of the heroic deeds of Grace Darling.

Farnese, *fahn na'sa*, an illustrious family of Italy, whose descent may be traced from about the middle of the thirteenth century and which gave to the Church and the Republic of Florence many eminent names. The name of the Farnese is associated with several famous works of art found at Naples. See FARNESE PALACE.

Farnese Palace, a celebrated building in the city of Rome, erected by Pope Paul III and completed by Michelangelo. It is one of the finest palaces in Rome, and the blocks of stone of which it is constructed were taken from the theater of Marcellus and from Colos. Most of the art treasures formerly contained in it are now at the museum of Naples, but a few excellent works remain. The Farnese Bull and the Farnese Hercules were first placed here. The palace now belongs to the ex-king of Naples, the Farnese family having become extinct.

Faroe, *fa'ro* or *ja'ro e*, Islands, a group of islands in the North Atlantic, lying between Iceland and Shetland. They belong to Denmark and are twenty-five in number, of which seventeen are inhabited. The chief island, Strömö, is 27 miles long and 8 miles wide, and others are Osterö, Vaagö, Borö, Viderö, Sandö and Suderö. The entire area is 514 square miles. The coasts are steep and are indented with deep inlets. The islands are mostly of volcanic rock, and they are frequented by hurricanes. The inhabitants are chiefly engaged in fishing and the rearing of sheep. Thorshavn, in Strömö, is the seat of government. Population in 1911, 18,000.

Far'ragut, DAVID GLASGOW (1801-1870), a famous American naval officer. He entered the



DAVID G. FARRAGUT

navy as midshipman at the age of nine, took part in the War of 1812 and in the Mexican War, held various positions of importance and for the four years after 1854 was employed in founding the Mare Island Navy Yard, at San Francisco. In 1861 he was assigned to go with the expedition against New Orleans, undertaken on the formation of the Confederacy, and sailed in February of the following year. New Orleans surrendered to the combined attack of the land and naval forces in April, and Farragut, after

taking possession of Baton Rouge and Natchez and running the batteries at Vicksburg, joined the Union fleet above. In consequence of his success at New Orleans he was promoted to the rank of rear admiral. In 1863 Farragut passed the batteries at Port Hudson and was of the greatest assistance to the land forces in the attacks on Port Hudson and Vicksburg. In August, 1864, he attacked the Confederate fleet in the Bay of Mobile and forced it to surrender, thus making the fall of Mobile merely a question of time. In 1866 he was made admiral, a grade which till then had not existed in the United States navy.

Far'rar, FREDERICK WILLIAM (1831-1903), a writer, preacher and teacher, born at Bombay, India, and educated at the University of London and at Trinity College. In 1855 he was assistant master at Harrow and later was the head master of Marlborough College, which he made one of the first schools in England. He also served as chaplain of the House of Commons and was dean of Canterbury in 1895. He wrote many works of fiction, biography, philology and history. Among his principal works are *Life of Christ*, *Life of Saint Paul* and *The Eternal Hope*. These books are for the masses and helped to raise religious thought to a higher plane.

Farthing, *fahr'thing*, in English money, a common coin of bronze, equal to a fourth part of a penny and about one-half a cent in United States money. See POUND.

Far'well, CHARLES BENJAMIN (1823-1903), an American statesman and merchant, born in New York State. He removed to Illinois and was county clerk of Cook County from 1854 to 1862. He engaged in the wholesale dry goods business with his brother, and in 1870 he was elected to Congress. He was reelected for the term 1872-1874, and again from 1880 to 1887. In that year he was elected to the United States Senate, to fill the unexpired term of John A. Logan.

Fasces, *fas'seez*, among the ancient Romans, a bundle of polished rods, in the middle of which was an ax, carried by lictors before superior magistrates. The number of fasces and lictors varied with the dignity of the magistrate. In the city the ax was laid aside.

Fashion, *fash'un*, the prevalent style in dress; usages which society adopts at its pleasure and imposes on its members. To be dressed *in fashion* is to be dressed in accordance with the accepted character, or style, of each part of the apparel. Fashions change from time to time

and are ostensibly based on what is most serviceable in practice and sometimes on what is most elegant in design. The various fashions of past ages, however, show that caprice has been responsible to a greater degree for the frequent and marked changes than practical consideration. See **DRESS**.

Fasho'da, a town in the Egyptian Sudan, founded in 1867 by the Egyptian government. When the revolt of the Mahdi occurred in 1881, the inhabitants of Fashoda almost deserted it. In 1898 it was occupied by the French, and the British later in the same year demanded that the French leave it. Only by making numerous commercial concessions to the French did the British secure the evacuation of the town.

Fast'ing, the partial or total abstinence of mankind and animals from the ordinary requisite supply of food, by which is to be understood that quantity which is adapted to preserve them in a healthy and vigorous condition. Various warm-blooded animals are capable of living without food much longer than human beings. Cats and dogs have survived for several weeks without nourishment of any kind, and hibernating animals have lived several months, but it is probable that few human beings could survive such deprivation for more than a week. Death usually ensues after the fifth or sixth day, especially if there is a loss of four-tenths of the weight of the body. The use of water without solid food enables life to be sustained much longer than it could otherwise be.

Fasts, temporary abstentions from food, especially on religious grounds. Abstinence from food, accompanied with signs of humiliation and repentance or grief, is to be found in nearly all religions. The Mohammedans fast during their month Ramadan. A Jew fasts on the anniversary of a parent's death, on his birthdays after he is thirteen years of age, and on the birthdays of his first-born son till he is thirteen, besides the regular fast days. The Greek Church observes forty-eight days at Easter and thirty-nine at Christmas. Other churches have fixed fast days. Among the fast days appointed by presidents of the United States were January 12, 1815; the last Thursday of September, 1861; April 30, 1863; the first Thursday in August, 1864; June 1, 1865; May 9, 1878; September 26, 1881.

Fat, an oily substance, found in all parts of the body except the teeth, bones and fibrous tissue, is abundant in milk, in the marrow of bones and around various internal organs. It

gives the human frame its smooth, rounded outline and, being a bad conductor of heat, it is useful in retaining warmth. It aids the movements of certain organs, as the eye, the orbit of which is lined with fat. The quantity of fat varies at different periods of life, being most abundant in the young and in middle life.

Fa'talism, the belief in fate, or an unchangeable destiny, to which everything is subject, and by which every act is preëstablished. Among notable historical examples of the belief in fate may be mentioned the old Greek conception of a fate which stood behind the gods themselves as a controlling power, and the Mohammedan fatalism, which regards all things great and small as inexorably predetermined, so that no accident is possible.

Fata Morgana, *jah'tah mor gah'nah*, the name of a peculiar mirage, occasionally seen in the Strait of Messina, between the coasts of Sicily and Calabria. The images of men, houses, towers, palaces, columns, trees and other objects are occasionally seen from the coast, sometimes in the water, sometimes in the air and often at the surface of the water. The same object has frequently two images, one in the natural and the other in an inverted position. The name means fairy Morgana, a fairy who was supposed by the ancients to cause the illusion. See **MIRAGE**.

Fates or Parcae, in Greek and Latin mythology, the three sisters who spin the thread of



THE THREE FATES

human life. The name *Clotho*, which means *the spinner*, probably belonged originally to all of them, but as poets attempted to describe more precisely the duties of each one, separate names were assigned to them, *Clotho*, *Lachesis* and *Atropos*. *Clotho* spun the thread of life; *Lachesis* decided the fate, and *Atropos* with her great shears cut the thread.

Father-lasher, *jah'thur lash'er*, a fish from eight to ten inches in length, belonging to the

Father of Angling

sculpin genus. The head is large and is furnished with several formidable spines. The fish is found on the rocky coasts of Britain and near Newfoundland and Greenland. In the latter regions it attains a much larger size and is a common article of food.

Father of Angling. Izaak Walton, author of *The Compleat Angler*. See WALTON, IZAAK.

Father of English Prose, a title sometimes given to King Alfred; sometimes to Roger Ascham.

Father of Epic Poetry, a name commonly given to Homer.

Father of History, a name given to Herodotus.

Father of Lies, Satan.

Father of Medicine, a name given to Hippocrates.

Father of the Faithful, the name of Abraham, the ancestor of the Jewish nation.

Father of Waters, the common name of the Mississippi River.

Fath'om, a unit of length in the English system, equal to 6 feet. It is chiefly used in the measurement of the depth of large bodies of water.

Fatigue, *fa teeg'*, a condition of the body or of the mind, following prolonged exertion. Fatigue is usually considered in connection with the muscles and nerves, though any organ of the body may become fatigued. Exercise of the muscles is accompanied by the accumulation in the muscular tissue of certain substances whose composition is not well understood, but which have a poisoning effect. Under normal conditions these substances are carried off by the blood, but a long period of exercise so charges the blood with them that it cannot remove them as fast as they accumulate, and fatigue follows. By injecting blood from a fatigued person into the veins of another, the feeling of fatigue is immediately developed in that person's system. Muscular fatigue is characterized by loss of contractile power in the muscle, a sense of weariness and failure to respond to stimuli which in an unwearied condition are easily recognized.

Fatigue in the nerves and brain is characterized by a shrinking of the nerve, as well as by loss of sensibility and mental power. In mental fatigue the powers of perception, memory, reason and feeling require more than the usual stimuli to arouse them to activity and also fail to produce satisfactory results.

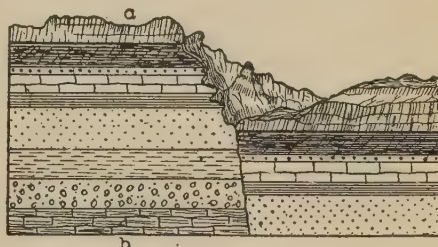
A certain degree of fatigue is beneficial to both body and mind, since, when in this condition,

Fauns

both the muscular and nervous tissues most readily receive nourishment, through which they acquire increased strength; but fatigue which produces exhaustion should be avoided, especially in the young. See ATTENTION; FEELING; MEMORY; SENSATION; WILL.

Fat'ty Degeneration, *de jen'ur a'shun*, a condition found in the tissues of the body, in which the healthy protoplasm is replaced by fatty granules. It is a sign of defective nutrition and is common in old age, affecting the muscles, the heart, the arteries, the kidneys and other organs. It is accompanied by great muscular flabbiness and want of energy, although the sufferer may appear fleshy and comparatively well.

Fault, in geology, a fracture of strata, accompanied by a sliding down or an upheaval of the deposits on the one side of the fracture to a



A FAULT

greater distance than on the other. The section *ab* in the cut shows the strata in their original position, while the section to the right shows the depression which caused the fault. Faults are frequently met with in coal beds, the miner coming unexpectedly upon an abrupt wall of other strata. The angle this makes with the plane of the bed he is working indicates whether he must look up or down for its continuation on the other side of the fracture. In mines these faults often serve for natural drains.

Fauna, a term used to designate the animal life of a certain geographical area or geological age, corresponding thus to the word *flora* as used in botany. Sometimes the region considered is small, sometimes very large; for instance, one may speak of the fauna of Cape Cod or of the fauna of North America.

Fauns, rural deities or demigods, who, the Romans believed, inhabited the forests and groves. They resembled the satyrs and were said to have pointed ears, short horns, goat's tails and sometimes even cloven feet. In later times the fauns were considered to be more

nearly human and were sometimes related to the animal world merely by pointed ears or horns.

Faure, *for*, FRANCOIS FELIX (1841-1899), a French statesman, president of the French Republic. He took an active part in the Franco-Prussian War and for his gallant services was decorated with the ribbon of the Legion of Honor. He became a member of the Chamber of Deputies in 1881 and later became under-secretary of state. On the resignation of Casimir-Perier in 1895, Faure was elected president. His administration was safe and conservative, but not brilliant.

Faust, *foʊst*, JOHANN (about 1485-about 1540), a celebrated dealer in the black art, who lived in Germany. Accounts of him tell that in his sixteenth year he went to Ingolstadt and studied theology, attaining great distinction, but abandoned theology and began the study of medicine, astrology and magic, in which he likewise instructed his companion Wagner, the son of a clergyman at Wasserburg. After Faust had spent a rich inheritance, he, according to tradition, made use of his power to conjure up spirits and entered into a contract with the devil for twenty-four years. A spirit called *Mephistopheles* was given him as a servant, with whom he traveled about, enjoying life in all its forms, but the evil spirit finally carried him off. Even yet Faust and his friend Wagner play a conspicuous part in the puppet shows of Germany, and the legend forms the subject of Goethe's great drama *Faust* and furnishes the libretto for Gounod's famous opera of the same name. As early as 1590 the legend was dramatically treated in England by Christopher Marlowe.

Faust or **Fust**, JOHANN (?-about 1466), a German printer, the partner of Gutenberg, the importance of whose discovery he was one of the first to recognize (See GUTENBERG, JOHANNES). There are extant certain works which were published in the printing shop of Faust. The most famous publications which came from his press are the so-called Mazarin Bible and a psalter with beautifully illuminated initials, the first book published with complete dates. See PRINTING.

Fawcett, *foʊ'set*, HENRY (1833-1884), an English politician and economist, educated at Cambridge. After studying law for a time, he turned his attention to economic studies and in 1863 was elected to the chair of political economy in the university at Cambridge. Two

years later he was elected member of Parliament for Brighton and in 1868 he was reelected. He became postmaster-general in the second Gladstone administration and effected many reforms in his department. Among his writings, all of which are strongly in favor of free trade, are *A Manual of Political Economy* and *Lectures on the Economic Position of the British Laborer*.

Fawkes, *foʊks*, GUY (1570-1606), an English conspirator. See GUNPOWDER PLOT.

Fayal, *fi ahl'*, an island belonging to Portugal, one of the Azores. It is of a circular form, about 10 miles in diameter. The climate is good, and the air is always mild and pure. The soil is very fertile, producing in abundance wheat, maize, flax and almost all the fruits of Europe. It exports a great quantity of oranges and lemons. The chief place is Villa Horta, or Orta. Population, estimated at 26,000.

Feasts. See FESTIVALS.

Feather Grass, *feh'ur gras*, a native of dry places in the south of Europe. The leaves are rigid, pointed and grooved; the awns of the flowers are exceedingly long, feathering to the point. The rush-leaved feather grass is found on prairies in our Western states.

Feathers, outgrowths from the skin, which constitute the covering of birds. The feather consists of a stem, horny, round, strong, and hollow in the lower part, called the *quill*, and in the upper part, which is called the *shaft*, filled with pith. On each side of the shaft is a web, composed of a series of regularly arranged fibers, called *barbs*. The barbs and shaft constitute the *vane*. On the edges of the barbs are set the *barbules*, which interlock with those of adjacent barbs and thus give strength to the vane. Feathers are generally divided into two kinds, *quill feathers*, found in the wing or tail, and *plumes*, or *clothing feathers*, generally distributed over the body.

The feathers of birds are periodically changed, generally once, but in some species twice, a year. This is called *molting*. When feathers have reached their full growth, they become dry, and only the tube, or the substance which it contains, continues to absorb moisture or fat. When, therefore, part of a feather is cut off, it does not grow out again; and a bird whose wings have been clipped remains in that situation till the next molting season, when the old stumps are shed and new feathers grow out.

Feathers form a considerable article of commerce, particularly those of the ostrich, heron, swan, peacock and goose. They are used for

plumes and ornaments, for the filling of beds and to a limited extent for making pens. The most expensive feathers are those of the ferwah, a rare and beautiful bird of paradise, which frequents the haunts of the tiger and therefore cannot be captured without great danger.

Feb'ruary, the second month in the year, having twenty-eight days, except in leap year, when it has twenty-nine. This latter number of days it had originally among the Romans, until the Senate decreed that the seventh month should bear the name of Augustus, when a day was taken from February and added to August to make it equal to July in number of days.

Federal Hall, the building in which the first national Congress met in New York City and in which Washington was first inaugurated. The building was erected as a city hall in 1699, but was remodeled for the use of the national



FEDERAL HALL

government. Federal Hall was torn down in 1836, when a sub-treasury was erected on its site.

Federalist, *THE*, a collection of eighty-five essays favoring the adoption of the Constitution of the United States, written by Alexander Hamilton, John Jay and James Madison and published by them in newspapers in 1788, over the signature *Publius*. It has been called "the political classic of the United States" and is considered one of the most important commentaries on the Constitution.

Federal Party or **Federalists**, a name assumed by that party in the United States who favored the adoption of the Federal constitution and sought to increase the powers of the national government. They advocated a strong central government, operating upon the people directly. They came into power in 1789 with the election of Washington to the presidency, but were defeated in 1801 and went out of

existence about 1817. The Federal party was the forerunner of the National Republican, Whig and present Republican parties. See **POLITICAL PARTIES IN THE UNITED STATES**.

Fee'ble-mind'ed, **EDUCATION OF**. The first attempt made in the United States to educate this class of unfortunates was undertaken in 1848 at the suggestion of Dr. Samuel G. Howe, superintendent of the Perkins Institute for the Blind, Boston. The success was such as to lead to the founding of the Massachusetts School for Idiots three years later. This was the first institution in the country entirely devoted to the education of the feeble-minded. New York followed the example of Massachusetts and was, in succession, followed by Pennsylvania, Ohio, Kentucky and other states, until sixteen states had established homes for the feeble-minded. Of these New York has three, New Jersey two and the other states one each. There are also a number of private institutions devoted to the same work.

The institutions for the education of the feeble-minded differ from those for the education of other defective classes, such as the deaf and blind, in that they must make provision for a continuous residence of all the inmates. The idiotic and the imbecile, being of weak wills, are subject to the temptations and evil designs of all who prey upon them. For this reason all institutions of this kind endeavor to secure large tracts of land, which enable them to afford farm work for most of the men.

The methods of instruction are similar to those employed in the best kindergartens and primary schools. These people are merely children in mind, though adults in body, and many of them take great pleasure in kindergarten occupations, such as are given to normal children of from four to six years of age. The brightest of the pupils learn to read and write, and a few are capable of learning number as far as multiplication. However, the most beneficial work is of an industrial nature. The girls are taught all lines of housework and also fancy needle-work, knitting, crocheting and embroidery. General exercises in music, calisthenics and military drill are used for the purpose of assisting the pupils to control their muscular movements and to work in harmony. The greatest patience on the part of the teachers is necessary, and those engaged in the work usually have special aptitude for it and devote their lives to it.

Every effort is made to make the home

pleasant and to keep the inmates pleasantly occupied and happy. In nearly all cases these efforts are successful.

Fee'han, PATRICK A. (1829-1902), a Roman Catholic archbishop, born in Tipperary, Ireland, and educated at Maynooth College, Kildare. He came to the United States and was pastor of Saint John's Church, Saint Louis; later he became a priest in the Church of the Immaculate Conception and was made president of the Seminary of Carondelet. As bishop of Nashville, after the Civil War, he made the diocese one of the strongest in the country. In 1888 Feehan was consecrated first archbishop of Chicago. He is the founder of the Catholic Knights of America.

Feel'ing, that state of consciousness which results from the application of a stimulus to the extremity of some sensory nerve. It is the most universal of the senses, since it exists wherever there are nerves, and they are distributed over all parts of the body, though most numerous in the finger tips and on the lines where skin and mucous membrane pass into each other, as the lips. The structures which give the impressions of contact are papillae, or minute elevations of the skin, in which the nerves end, and which are richly supplied with blood vessels. The term *feeling* is also used for a general sense of comfort or discomfort which cannot be localized, and it is thus that the disturbances of internal organs often manifest themselves. In a figurative sense the term is also applied to a mental emotion, or even to a moral conception; thus we may speak of a friendly feeling or a feeling of freedom.

Feeling, the emotional element in consciousness. Feeling accompanies all mental acts and constitutes the personal element in them. It is the internal side of all mental activity and that which enables us to join the self to the outside world. It is through feeling that we recognize selfhood, or the difference between you and me. We can understand feeling only through experience. Unless one has felt joy and sorrow, pleasure and pain, all the literature ever written upon these subjects could not make him understand them. Because feeling is such a strong personal element in mental activity, it is difficult to define, and nearly all definitions are vague and unsatisfactory.

CLASSIFICATION OF FEELINGS. Feelings are divided into two classes, sensuous and ideal, or formal.

Sensuous Feelings. Sensuous feelings are

those arising from certain physical conditions. They are often divided into two divisions, those arising from the general senses, such as hunger, thirst and fatigue, and known as *organic*, and those arising from the organs of special sense, such as the pleasure derived from viewing a beautiful picture or hearing a sweet melody, and called *special*. These feelings must not be confounded with sensations. Sensations furnish the stimuli which arouse the mind to action. We locate the sensation in the object which produces it. Feeling is in the self. I locate the tone of the piano in the instrument, not in the ear; but if I burn my hand on a hot iron, I locate the pain in the hand, and not in the iron. See SENSATION.

Ideal, or Formal, Feelings. Ideal, or formal, feelings are those which arise from mental states. In their highest form they are complex, specific, and exercised towards a special object, as admiration for a picture, love for one's parents. They are of two classes; egoistic and altruistic. The *egoistic* feelings are those which center within the self, and for this reason are often termed *selfish*. They should not, however, be confused with selfishness, as that term is ordinarily used. Selfishness means the advancement of the self without regard to the rights of others, but proper self-interests, such as self-respect and desire to improve, are essential to all other interests, and egoistic feelings of this sort are necessary to the right development of character. Altruistic feelings are directed towards objects outside the self, and when highly specialized and complex are termed *emotions*. See EMOTIONS.

QUALITY OF FEELING. Feelings are either pleasurable or painful. These qualities are intimately associated with the condition of the nervous system. Pleasure results from working off a surplus of nervous force and energy; children enjoy running and other muscular exercises for this reason. One also enjoys quietude after severe exercise.

Pleasure may be turned into pain. Exercise which in the beginning is enjoyable becomes painful after the system is fatigued. Even the sweetest music grows tiresome if persisted in too long. Pain may likewise be turned to pleasure. A review of one's experiences will reveal the fact that many of the pleasures most enjoyed in adult life are results of what in the beginning were painful practices. Such are skating, riding a bicycle and performing other acts which were learned by effort so strenuous that it was often

painful. Many people acquire a fondness for clams, oysters, olives and other articles of food by practice in eating them. When first eaten, these were usually far from enjoyable.

INTENSITY OF FEELING. The intensity of feeling is affected by:

(1) The amount of stimulus. The burn from a red-hot iron is more painful than the sting of a mosquito.

(2) By the prolongation of the stimulus. The effect of a stimulus, which at first produces a keen sense of feeling, by long continuation is perceptibly diminished. Similar effects are produced upon mental states. Continual fault-finding, scolding or praise becomes tiresome and after a time has no effect upon those subjected to it.

(3) By change of stimulus. The feelings are intensified by changing the stimulus so as to excite one set of sensitive organs and then another.

The above principles apply almost entirely to sensual feelings. The intensity of ideal feelings depends largely upon the reverse of these principles. Usually, the longer we dwell upon an idea, the deeper the feelings to which it gives rise. One's love for one's parents, resentment of an insult or interest in a subject grows stronger the more one dwells upon the ideas which give rise to the feeling. Ideal feelings are often vivified by the imagination and are easily recalled by the memory, but they are in the last analysis dependent upon the sensuous feelings for their origin, as one's love for his mother or friends originates in the pleasure derived from their ministrations.

CULTURE OF FEELINGS. The proper culture of the feelings is essential to one's development of a right character and to one's happiness. The child can be assisted in the cultivation of his feelings if those who have charge of his education will give heed to the following principles:

(1) During childhood feelings are narrowly egoistic and very intense. Their activity is not subject to the control of the will nor guarded by reason.

(2) Feelings strengthen with use. When one gives way to anger once, it is easier for him to do so again. Likewise, every time one controls his feelings under trying circumstances, he acquires increased power of self-control. Children should be led to acquire the power of self-control early. They should never be subjected to teasing or otherwise unnecessarily irritated. Such treatment often results in the formation

of mental habits which are a hindrance through life.

(3) The intellectual feelings arise from the egoistic. The child's first desire for knowledge is aroused by what he sees others doing, for he wishes to possess the power which will enable him to accomplish the same results. If wisely led in fulfilling this desire, he gradually acquires a love of knowledge for its own sake, and study becomes a pleasure.

(4) The acquisition of knowledge is most satisfactory when the act is accompanied by feeling of a low degree of intensity. Strong emotion prevents careful reasoning; hence, the arousing of undue excitement under the name of enthusiasm is injurious to the work of the school and will seldom, if ever, be resorted to by a judicious teacher.

(5) The esthetic feeling, or love for the beautiful, is an important factor in the development of character and should receive early attention.

(6) The moral sentiment should be trained along with the intellectual and the esthetic. This is accomplished most successfully through concrete illustrations which appeal to the child's love and sympathy, such as fables and tales.

(7) The imagination and the feelings are very closely related. The child's imaginary joys or sorrows may be made to appear stronger than the realities. See **IMAGINATION**, subhead *Culture*.

(8) Happiness is the natural state of life, and nearly all our struggle is for the purpose of gaining happiness. The school and the home should be places of enjoyment, but the most thorough enjoyment is obtained through the wise and healthy use of all the child's powers. The school and home which give this sort of enjoyment contribute most to the child's welfare. See **PSYCHOLOGY**; **WILL**; **METHODS OF TEACHING**.

Feldspar, *feld'spahr*, one of the most common minerals, composed of silica, alumina, potash and soda or lime. There are about fifteen varieties, and in some form or other feldspar constitutes the principal part of all igneous and metamorphic rocks (See **IGNEOUS ROCKS**; **METAMORPHIC ROCKS**), such as granite, gneiss, porphyry and greenstone. Common feldspar is white or flesh-colored and is a little softer than quartz. It is usually feldspar that gives granite its peculiar color when polished. Common feldspar is often known as *orthoclase*, and a peculiarly white variety is known as *albite*. In a lime feldspar lime constitutes about one-fifth of its composition.

Felegyhaza, *fa'lagsh hah sa*, a town of Hungary, 66 mi. s. e. of Budapest. It has cattle markets and an extensive trade in corn, wine and fruit. Population in 1910, 34,000.

Fe'lix, ANTONIUS, a Roman governor of Judea in the time of Paul. Throughout his reign, Judea was greatly disturbed by revolts, and Felix put these down with unnecessary severity. It was Felix to whom Claudius Lysias sent Paul, as described in *Acts XXIII*, 23. Paul's pleading before Felix and Felix's treatment of him are described in *Acts XXIV*.

Fel'lah, an Arabian word meaning *peasant*, used for the laboring class in Egypt. The fellahs, or *jellahin*, constitute about three-fourths of the population of Egypt and are mostly the direct descendants of the old Egyptians, although both their language and religion are now that of their Arabian conquerors. They live in rude huts by the banks of the Nile and have suffered much from overtaxation and oppressive rule. See EGYPT.

Fel'low Ser'vants. See MASTER AND SERVANT.

Fel'lowship, an honorable position in some universities, both in the United States and England, which entitles the holder, called a *fellow*, to an annual income for a certain period. Fellowships in the English colleges commonly range in value from about \$750 to \$1250 or \$1500 a year, and they all confer upon their holders the right to apartments in the college and certain privileges as to commons, or meals. Six or seven years is the common period during which they may be held, though this may be prolonged in certain circumstances. Fellowships in the United States are usually for one year, though the student may be reëlected, and in value are seldom more than \$500.

Fel'ony. See CRIME.

Felt, a kind of cloth made of wool or of wool and fur matted together, with the aid of moisture and heat, by rolling, beating and pressure. The materials to be felted are carded, are placed in a machine where they are kept moist and are mixed together by a process of beating. They are then passed between rollers, subjected to pressure and united into a compact mass. Felt-making is supposed to have originated in western Asia and the best qualities are still made in Persia and neighboring countries. The use of felt for hats, cloaks, tents and floor mats is very ancient. It is now in general use for hats, clothing, upholstering, carpets and many other articles. Because of its being a nonconductor

of heat, it is much used for roofing, sheathing hot water reservoirs and the like.

Fe'mur. See SKELETON.

Fen, a marsh or stretch of wet, boggy land, often containing extensive pools. The *Fens*, or the *Fen District*, is a special term for marshy districts in England. Much of the land has been reclaimed at a vast expense. The soil of fen lands is generally black and rich to a depth of 2 or 3 feet.

Fence, *fens*, an enclosure round a field or yard. Fences are made of boards, stone, rails and wire. They are used to keep animals in pastures, to protect fields and yards from stray animals and for the purpose of herding flocks. Live fences, or hedges, are made by planting willow, osage orange or other shrubs close together in rows. As the plants grow, their branches interlace and make a strong hedge. Fences around lawns and public parks are often of ornamental patterns. The large farms and ranches in the Western states usually have wire fences. The adoption of these fences has given rise to a large business in the manufacture of wire. Some of this wire contains barbs, which are pointed wires twisted into the main wire at regular intervals. See WIRE.

Fencing, *fens'ing*, the art of attack and defense with sword or rapier, no shield being used. It was in Italy in the sixteenth century that the skillful use of the small sword first became common. The art spread to Spain and then to France, where, on account of the prevalence of dueling, it was brought to a high degree of development. The small sword, or rapier, (which was adopted for dueling) has a point, but no edge, and therefore demands the highest degree of adroitness in its use. In the fencing schools the instrument adopted for exercise is called a foil; it has a guard of metal or leather between the handle and the blade, which is made of pliant steel and has a button at the end in place of a point. Fencing is still a favorite form of exercise in gymnasiums and schools in this country, though it has never taken first rank.

Since the introduction of the bayonet, bayonet exercise has become an important department of fencing in the army. In handling the bayonet defensively, the right foot is thrown back and receives most of the weight of the body, the knees are bent, the bayonet is brought to a horizontal position, level with the waist. This is the "guard," and according to the parry to be made the weapon is carried either to the "high" position, pointing upward from the breast, or

to the "low" position, pointing downward from the breast. In taking the offensive the right leg is straightened, and the left bent forward, without moving the feet from their place. The butt of the rifle is pressed firmly to the shoulder and points straight forward. In "shortening arms," the butt is carried back to the full extent of the right arm, while the barrel (turned downward) rests upon the left arm. The body rests upon the right leg, which is slightly bent, while the left is somewhat advanced.

Fenelon, *fa n'lohN'*, FRANCOIS DE SALIGNAC (1651-1715), an eminent French educator, born in the Province of Perigord and educated in the schools of Kahors and the University of Paris. Soon after completing his education, he became the head of an institution for the instruction of young women. This led him to give special attention to the education of women and to write a treatise on *The Education of Girls*, which was the first systematic work of its kind ever prepared. It was a plea for the general education of women, particularly in the subjects and arts which should fit them for the home and other spheres that women at that time were expected to fill. Fenelon believed that only as women are educated could the moral and educational standard of the community be raised. He therefore considered the education of girls as essential as that of boys. It is his position as a leader in the movement for education of women that gives him prominence among the great educators of the world.

Fen'ians, an organization of Irish-Americans, founded in 1861 for the purpose of aiding in the forcible separation of Ireland from England. Their most important organ, the *Irish People*, which was published in Ireland, was seized by the British government in 1865, and many leaders of the movement were arrested; but in the same year a convention at New York determined to establish an independent government in America. This led to an armed movement, which resulted in several attacks on the Canadian frontier in 1866 and an incipient rebellion in Ireland in the following year. Both were quickly suppressed.

Fen'nec, a small animal, allied to the dog and fox and sometimes called the *Sahara fox*, as it is a native of that region. It burrows with great facility and lives on small animals and fruits. Its chief peculiarity lies in its very large ears. The fennec is easily tamed.

Fen'nel, a fragrant plant of the parsley family, cultivated in gardens. It bears umbels

of small, yellow flowers and has finely divided leaves, which give off a pleasant odor. The fruit, or in common language, the seed, is frequently employed in medicine.

Fer-de-lance, *jair de lahNs'*, the lance-headed viper, a serpent common in Brazil and some of the West Indian Islands, and one of the most terrible members of the rattlesnake family. It is five to seven feet in length and is of a reddish-yellow brown, marked with a black stripe from the eye to the neck and dark bands across the body. The tail ends in a horny spine, which it scrapes harshly against rough objects, but does not rattle. Its bite is usually fatal.

Ferdinand, *fur'de nand*, the name of many European monarchs. Among them may be mentioned *Holy Roman emperors*, Ferdinand III (1608-1657) (See also FERDINAND I; FERDINAND II); *emperor of Austria*, Ferdinand I (1793-1875); *kings of Castile*, Ferdinand I (?-1065), Ferdinand III (1199-1252), Ferdinand IV (1285-1312) (See also FERDINAND V, King of Aragon); *kings of Spain*, Ferdinand VI (about 1712-1759) and Ferdinand VII (1784-1833); *kings of Naples and Sicily* (See FERDINAND II, FERDINAND IV).

Ferdinand I (1503-1564), Holy Roman emperor, brother of Charles V of Germany, from whom he received, soon after Charles's accession as emperor, the hereditary possessions of the Hapsburgs in Austria. For many years he was chiefly occupied with a war with the Turks, who supported as king of Hungary John Zápolya, waywode of Transylvania. When Charles V abdicated the imperial throne in 1556, Ferdinand succeeded him. His rule was wise and enlightened, and he introduced a number of reforms.

Ferdinand II (1578-1637), Holy Roman emperor, grandson of Ferdinand I. He became duke of Styria, Carinthia and Carniola in 1590 and showed at once a determination to uproot Protestantism from his dominions. This well-known aversion to the Protestant faith was the cause of determined protest from the Protestants of Bohemia, when in 1617 Ferdinand was crowned king of that country (See AUSTRIA-HUNGARY). The result of this opposition to Ferdinand was the outbreak of the Thirty Years' War. In 1619, after the death of Matthias, Ferdinand was made emperor. Ferdinand died before the Thirty Years' War was completed.

Ferdinand II (1810-1859), king of the Two Sicilies, succeeded his father Francis I in 1830. The revolution in France in this year had un-

settled the minds of men throughout the Continent, and Ferdinand was at first forced to make some concessions to his subjects, but soon recalled them, determining henceforward to make his will the only law. The result was a series of popular outbreaks, culminating in the year 1848, when Ferdinand earned the nickname of King Bomba, from his bombardment of Messina. Despotism was again established by force of arms, and when Ferdinand died his prisons were crowded with the best and bravest of his subjects.

Ferdinand IV of Naples, known, also, as Ferdinand I of the Two Sicilies (1751-1825), was the third son of Charles III, king of Spain, whom he succeeded in 1759 on the throne of Naples, on the accession of Charles to the throne of Spain. After the death of Louis XVI Ferdinand joined the coalition against France and took part in the general war from 1793 to 1796; but in 1799, after the defeat of the Neapolitans under General Mack, the French took possession of the whole kingdom and proclaimed a republic. The new republic did not last long, but six years later Ferdinand was again driven from Naples by the French. After the downfall of Napoleon he once more came to power and took the title of Ferdinand I, king of the Two Sicilies. In 1820, in consequence of a revolution, Ferdinand was obliged to swear to support a new and more liberal constitution. The Austrians, however, came to his help and reestablished him in possession of absolute power.

Ferdinand V (1452-1516), king of Aragon, who received from the pope the title of the *Catholic*, on account of the expulsion of the Moors from Spain, was the son of King John II. In 1469 he married Isabella of Castile and thus brought about that close connection between Aragon and Castile which became the basis of a united Spanish monarchy and raised Spain to preëminence among European states. After a bloody war of ten years Ferdinand and Isabella conquered Granada from the Moors (1491); but the most brilliant event of their reign was the discovery of America, which made them sovereigns of a new world.

Fergus, fur'gus, Falls, MINN., the county-seat of Otter Tail co., 187 mi. n. w. of Minneapolis, on the Red River and on the Great Northern and the Northern Pacific railroads. The city is in an agricultural and lumbering region and has good water power. The various manufactures include flour, woolen goods, wagons, undertakers' supplies, liquors, and foundry and

machine shop products. It is the seat of the Park Region Lutheran College, Northwestern College and a state hospital for the insane. It was chartered as a city in 1863. Population in 1910, 6887.

Fermentation, the conversion of an organic substance into new compounds, by the influence of living organisms (See BACTERIA AND BACTERIOLOGY). There are several kinds of fermentation. The most important from an economic and industrial point of view is the *vinous*, or *alcoholic*, fermentation, in which the sugar in the liquid is converted into alcohol, carbonic acid and glycerine. In *acid* fermentations spirituous liquors become sour and acetic acid is formed. In *putrid* fermentation organic substances undergo various changes and generally set free poisonous gases (See PUTREFACTION). According to the nature of the result produced, fermentation is described as alcoholic, lactic, butyric and so forth. The general course of *alcoholic* fermentation, as seen in brewing and in wine-making, is as follows: After a lapse of time, which may vary much according to temperature and other conditions, the liquid becomes cloudy and gas bubbles arise, increasing in frequency until the liquid begins to effervesce. The temperature of the liquid rises to a higher degree than that of the surrounding air, and on its surface appears a frothy matter known as *yeast*. After a time the climax is passed, the effervescence diminishes and the yeast settles down at the bottom of the liquor, which is now entirely deprived of its sugar and has the characteristic taste and effects of fermented liquors. The fermentation may be checked or stopped by anything which prevents the growth of the bacteria, as, for instance, sulphuric acid or carbolic acid, which act as poisons on the fungus, or by a high or low temperature or by the development within the system of an excess of the products of fermentation. Each species of fermentation is occasioned by a particular microbe, and by no other. *Lactic* fermentation occurs in milk that has been allowed to stand, and it results in the sugar of the milk being converted into lactic acid. *Butyric* fermentation follows lactic fermentation when the latter is allowed to proceed. It is evident that the fermentations set up by bacteria play no small part in the cause and progress of disease. See GERM THEORY OF DISEASE.

Fermented Liquors, alcoholic beverages, obtained by the fermentation and clarification of fluids containing sugar. Among the commonest kinds are *wine*, made from the juice of the

grape; *ale*, or *beer*, made from an infusion of malt; *cider*, made from apples; *mead*, made from honey; *kumiss*, made by the Kirghiz from mares' milk, and *chica*, made from maize by the South American indians. From all fermented liquors a spirit may be extracted by distillation. See FERMENTATION.

Fern Islands. See FARNE ISLANDS.

Ferns, the largest and most important family of the cryptogams, or flowerless plants. They are leafy plants, the leaves, or, more properly, fronds, rising from a rhizome or rootstock or from a hollow, tree-like trunk. The fronds, as they appear from the ground, are rolled up at



CRESTED SHIELD FERN



CHRISTMAS FERN

the tip, so that they have somewhat the appearance of a bishop's crozier. There are probably not less than 4500 species of ferns, many of which live in the temperate regions, but the greatest number are found in the tropics, where heat and moisture encourage them to remarkable growth. In the tropical forests the tree ferns rival palms, rising sometimes to a height of fifty to sixty feet and bearing crests of fronds twenty feet in length. Gracefulness and beauty are characteristic of all of them. Most of them grow in the earth, but some are aquatic, and many of the tropical species are air plants. Upon the fronds, in little dots or lines, or occasionally covering the whole leaf-surface, are ripened the minute, brown, dust-like spores. These, falling upon the ground, germinate and produce a minute hair-shaped body, not resembling at all the parent fern. Upon this body are produced the organs from which, in time, springs the commonly recognized fern in its original form, thus making a perfect illustration of the alternation of generations. Some ferns have medicinal qualities, and others afford food, though not in large quantities. While among the most beautiful plants, they are not especially useful and are not in the present age of so great

relative importance as they were. during the period when the coal deposits were formed; then they were the prevailing type of vegetation and grew to enormous size, forming the vast forests which were preserved in our coal deposits.

Ferrara, *fer rah'rah*, a city of northern Italy, capital of the province of the same name, 26 mi. n. n. e. of Bologna, in a fertile but unhealthy plain. It is a well-built town and has many remains of its former splendor. The old ducal castle, or palace, now occupied by public offices; several other palaces; the cathedral; the Church of San Francesco; the houses where Ariosto and Guarini lived; the cell in which Tasso was imprisoned, and a monument to Savonarola, who was born here, are some of the interesting features of Ferrara. The city has, also, a public gallery of paintings, a university, founded in 1264, a theological seminary and a library. In the fifteenth century it was famous for its school of painting, one of the best in Italy. Under the rule of the famous House of Este, Ferrara was the capital of a sovereign duchy and rose to a rank of great importance and wealth, having a population of more than 100,000. The popes came into possession in 1598, and after this the city fell into decay. Population in 1911, 95,196.

Fer'ret, a carnivorous animal, closely allied to the polecat, about fourteen inches in length, of a pale yellow color, with red eyes. It is a



FERRET

native of Africa, but has been introduced into the United States and Europe. It cannot, however, bear cold and cannot subsist even in France, except in a domestic state. Ferrets are used for hunting rabbits and for killing rats and mice. They rarely devour the animals which they attack, but kill them and suck their blood. Their slender bodies enable them to enter burrows, but unless muzzled the ferrets are apt to leave their victims behind after sucking their blood.

Fer'ris Wheel, the largest wheel ever constructed, originally erected at the World's Columbian Exposition at Chicago in 1893 and

named in honor of its inventor, Mr. G. W. G. Ferris, a Pittsburg engineer. It was composed of two wheels, each 250 feet in diameter, connected by rods and struts. At the center of the wheel was an axle 45 feet in length and 32 inches in diameter. The spokes of the wheel were iron rods $2\frac{1}{2}$ inches in diameter, arranged in pairs 13 feet apart at the crown connection. The wheel carried 36 cars, attached to the circumference, each having a seating capacity of 40 passengers. The total weight of the wheel was about 1100 tons. The wheel was elevated 14 feet above the ground, making its total height 264 feet. The total cost of the wheel was about \$300,000. At the close of the exposition it was taken down and removed to North Clark Street, Chicago, and was later taken to Saint Louis. It was finally demolished.

Ferrol, *fair role'*, EL, a fortified seaport of northern Spain, in the province of Coruña, and about 12 mi. n. e. of the town of that name. It is situated on a fine inland bay, connected with the sea by a channel so narrow as to admit only one ship-of-the-line at a time. The chief naval arsenal of Spain, established on a magnificent scale, is here. The manufactures consist chiefly of swords, cutlery and military and naval equipments. Population, 25,281.

Ferry, a boat for the transportation of passengers and freight across a narrow body of water. The name is also occasionally applied to the route which the boat traverses. Ferries across small streams are usually propelled by hand, either by the use of oars or by means of a rope stretched across the stream. On larger bodies of water steam ferries are employed. These boats are constructed with both ends alike, so that they can move in opposite directions without turning. Ferries for the transportation of passengers to and from large cities, such as New York and San Francisco, can accommodate several thousand passengers, and railway ferries are large enough to transport entire trains across such bodies of water as the Straits of Mackinac, the Detroit River and the Columbia River. Wherever they can be constructed without too great expense, bridges and tunnels are preferred to ferries, since they are less liable to obstruction.

Ferry, JULES FRANCOIS CAMILLE (1832-1893), a French statesman and writer. He became a barrister at Paris, but devoted himself almost entirely to journalism. His articles brought him much into notice, and in 1869 he was returned as deputy to the National Assem-

bly. After the fall of Sedan he became a member of the Government of the National Defense, and in 1872 Thiers appointed him minister to Greece, but he soon resigned. In 1879 he became minister of public instruction, and in 1880 he became premier. He was again premier in 1883. In February, 1893, he was elected president of the Senate, but died the same year.

Fer'tiliza'tion of Plants. See CROSS FERTILIZATION; POLLEN.

Fer'tili'zers, commercial manures, such as superphosphates and guano, all of which contain a large proportion of plant food. Fertilizers are made from various rocks containing compounds of phosphorus or potash, bones, blood and other refuse from slaughter houses. They vary in quality and in the substances they contain and should be selected with reference to their ability to supply the needs of the soil. Reliable information as to the best fertilizer to use in a given locality can usually be obtained by a farmer from the agricultural experiment station of his state. In most states the law requires the manufacturers of commercial fertilizers to take out a license for the sale of their product and requires a written guarantee for the amounts of potash, nitrogen and phosphoric acid which the fertilizers contain. The experiment stations analyze the fertilizers and determine the truth of the guarantees. In this way the farmer is protected against valueless fertilizers, which might do more harm than good. See MANURES.

Fes'senden, WILLIAM PITT (1806-1869), an American statesman, born in Boscawen, N. H., educated at Bowdoin College and admitted to the bar. He settled in Portland, Maine, was elected to the state legislature and in 1840 to Congress as a Whig. He became conspicuous as an anti-slavery speaker and in 1854 was elected United States senator. He delivered a remarkable speech against the Kansas-Nebraska Bill and became at once one of the acknowledged leaders of the anti-slavery party. In 1859, after his reelection to the Senate, he was made chairman of the committee on finance and performed notable service. President Lincoln appointed Fessenden secretary of the treasury after the resignation of Chase in 1864, and immediately he relieved the government's financial distress by issuing bonds in small amounts for popular subscription. He resigned in 1865 and reentered the Senate, taking a prominent part in the debates upon reconstruction. He voted for the acquittal of President Johnson on the impeach-

ment charge and temporarily lost prestige in his party, but soon regained it by his ability and sincerity.

Festivals or Feasts, certain days or periods consecrated to celebrations in honor of some god or in memory of some great event. Among the Jews, six sacred feasts were prescribed by the Scriptures. The ancient Greeks celebrated the Dionysia, the Eleusinia, the four great national games, the Olympian, Isthmian, Nemean and Pythian (See article on each of the Greek games), and also many local festivals. The Roman festivals were the Saturnalia, Cerealia, Lupercalia and others. Almost all the festivals celebrated by the Roman Catholic Church are commemorative of events in the life of Christ, such as the Sabbath, Easter, Epiphany, Nativity, Christmas, Ascension, Pentecost, Annunciation and Purification. Most of these are kept by the Church of England, with a few additions. The ancient Persians were the only people who had no festivals. Presbyterians and most other Protestant bodies, except Lutherans, recognize no church festival but Sunday, Christmas and Easter. Certain saints' days, formerly printed in red ink in the Church of England calendar, became known as *red letter* days, hence the modern use of the term. The old term, "holy day," has been changed to "holiday," which now signifies a day of merrymaking or of rest.

Festus, PORCIUS, Roman procurator of Judea about 61-62 A. D., the successor of Felix. The apostle Paul appeared before Festus, who asked if Paul would consent to be tried at Jerusalem. Paul then appealed to Caesar and was sent to Rome.

Fetish or Fetic, *fe'tish*, a word first brought into use by De Brosses, in his work *Du Culte des Dieux Fetiches* (1760), derived from the Portuguese *feitiço*, meaning *magic*. The Portuguese gave this name to the idols of the negroes of the Senegal, and afterward the word received a more extensive meaning. A fetish is any object which is regarded with a feeling of awe, as the possessor of mysterious powers, though these powers be exercised without any consciousness. The fetish may be animate, as a cock, a serpent; or inanimate, as a river, a tooth, a shell. Fetish worship prevails in Guinea and other parts of the west coast of Africa. In addition to the common fetish of the tribe, every individual may have one of his own. To this he offers up prayers, and if they are not heard he punishes his fetish or throws it away or breaks it in pieces.

Feudal, *fu'dal*, **Sys'tem**, that system by which land (a *fief*) is held by a vassal on condition of fidelity, that is, in consideration of services to be rendered to his superior or feudal lord. In the earliest times the relation of superior and vassal did not exist in connection with the ownership of land. Each freeman had his share of the tribe lands, which were held simply on condition of his fulfilling his public duties of attendance at the councils of the mark, or township, and performing his share of military service. The noble had, of course, more land and more influence than the simple freeman, but there was no tie of vassalage between them. The lands held by all freemen, whether noble or ordinary freemen, under this system, were said to be *allodial*, as distinguished from *feudal* lands, which implied service to a superior lord. By the close of the tenth century, however, this system had been considerably changed. The Teutons who overran Gaul and England had necessarily to confer exceptional powers on their leaders; and as they were long in the position of an army in an enemy's country, these powers were continued. Thus it was that kings, before unknown to the Anglo-Saxons, made their appearance immediately after the descent upon Britain.

It was common for a chief or a great man to have a retinue of valiant youths, who were furnished with arms and provisions and who in return served their chief. When conquered lands came to be apportioned and large districts fell into the hands of kings and their subordinates, these men gave certain portions of the territory to their attendants, for life. These estates were called *beneficia*, or *fiefs*, because they were only lent to their possessors, to revert after their death to the grantor, who immediately gave them to other servants on the same terms. As the son esteemed it his duty, or was compelled, to devote himself to the lord in whose service his father had lived, he received his father's fief; or rather, he was invested with it anew.

By the usage of centuries this custom became a right, and the fief became hereditary. Thus a feudal nobility and a feudal system arose, and for a time it existed alongside of the old allodial system. But gradually the greater security obtained by putting one's self under the protection of a powerful ruler gave the feudal system predominance. The free proprietor of landed property, oppressed by powerful neighbors, sought refuge in submitting to some more powerful nobleman, to whom he

surrendered his land, receiving it back as a vassal. Even the inferior nobility found it to be to their advantage to have themselves recognized as feudatories of the nearest duke or earl; and as the royal power steadily advanced, the offices of duke and earl were always bestowed by the king. Thus the crown became the source of all authority and possession in the country. The land which had once been "folkland," or the land of the people, became the land of the king, from whom all titles to it were derived. Such was the development of feudalism in England, where its centralizing tendencies were strongly reinforced by the conquest under William the Norman. Under him and his immediate successors the power of the king was increased at the expense of the nobles. On the other hand, in Germany, France and elsewhere on the Continent, the disintegrating tendencies of feudalism had full play. In these countries the weakening of the kingly authority encouraged the feudal dukes to gain almost absolute independence, which in France was afterward gradually lost, but in Germany continued to divide the land, almost to our own times, into a number of petty principalities.

Among the chief agencies that overthrew the feudal system were the rise of cities, the change in modes of warfare and the spread of knowledge and civilization. The spirit of the feudal system, grounded on the possession of landed property, was necessarily foreign to cities which owed their origin and strength to industry. The growth of this new social class, with its wealth and industrial importance, contributed more than anything else to the overthrow of feudalism. Even yet, however, the laws relating to land bear the stamp of feudalism. In England, for instance, all land owners are theoretically regarded as tenants holding from some superior or lord, though the lord may be quite unknown. See *SERFS*; *VILLEINS*.

Feuillet, *fo yay'*, OCTAVE (1821-1890), a French novelist and dramatist. He had written various novels and comedies before the appearance of *The Romance of a Poor Young Man* raised him to the first rank of the novelists of the day. Among his other numerous novels are *Monsieur de Camors*, *Julia de Trecoeur* and *A Marriage in High Life*. His works have a refined humor and are free, in great part, from the coarseness of the later French school.

Fe'ver, a condition accompanying many diseases and characterized by a rise in temperature, a feeling of weakness, loss of appetite,

headache and, frequently, pains in the body and limbs. During the fever the pulse and respiration become more rapid and the skin is dry. A period of decline usually follows the period of rise in temperature; during the lowering of temperature the patient perspires, the pain ceases and sleep usually follows. For a long time fevers were named from the malady which they accompanied; thus, a fever connected with inflammation of the lungs was known as *lung fever*. There are also *typhoid fever*, *scarlet fever*, *yellow fever*, *malarial fever* and numerous others. Fever is usually caused by local inflammation or by the development within the system of poisonous germs which have been taken in from without. It is not a separate disease, as was formerly supposed. What is called *intermittent fever* is one in which the temperature alternately rises and falls. In a low fever the temperature rises but little above the normal, being from 100° to 102°; but when the temperature rises above 103° and as high as 105°, the fever is considered high. Above 105° there is danger of fatality. Fever causes waste of tissue, and upon recovery the patient is left in an emaciated condition and requires some time for recuperation. See *PNEUMONIA*; *SCARLET FEVER*; *TYPHOID FEVER*; *YELLOW FEVER*, and other articles on diseases in which fever is a conspicuous symptom.

Fe'verfew, a plant common in waste places and near hedges. It has a tapering root, an erect, branching stem about two feet high, and stalked compound leaves, of a grayish-green color. The heads are small and white, with yellow centers. The plant possesses tonic and bitter qualities and was once supposed to be a potent means of driving away fever.

Fez, one of the two capitals of Morocco, 100 mi. e. of the Atlantic and 85 mi. s. of the Mediterranean. It is finely situated on the hilly slopes of a valley, on the River Fez, which divides Old Fez from New Fez. Both parts are surrounded by walls, now in a state of partial decay. The streets are narrow, dark and extremely dirty; the houses are two or three stories high, without windows to the street, but often with handsome interiors and paved courtyards and fountains. There are many mosques, one of them the largest in North Africa. The sultan's palace is large, but is now partially in ruins. Fez is the most important commercial city of Morocco, being the depot for the caravan trade in the south and east and having extensive dealings with Europe. The manufactures consist of

woolen cloaks, silk handkerchiefs, leather, the red Fez caps, carpets and pottery. Fez was at one time famous as a seat of Arabian learning. It was founded in 793 and was the capital of an independent state from 1202 to 1548, attaining a high degree of prosperity. The population, formerly about 400,000, is now estimated at 140,000.

Fez (from *Fez*, the name of a city in Africa), a red cap of fine cloth, with a tassel of blue silk or wool at the crown, much worn in Turkey, on the shores of the Levant, in Egypt and in North Africa generally. It is called the *tarbush* in Africa.

Fezzan', a state of North Africa, in the Sahara, forming a depression surrounded by mountain chains and consisting of a great number of small oases. Wheat, barley, millet, figs, melons and other fruits, tobacco and cotton are cultivated, but the chief wealth of the country is in its date palms. With the exception of goats and camels, and in some districts sheep and cattle, few domestic animals are reared. Murzuk is the capital and is the center of the caravan trade, and the only other important town is Sokua. The natives are a mixed race of Arabs, Berbers and negroes. Fezzan is governed by a lieutenant governor under the governor of Tripoli and is dependent, therefore, on Italy. Population, variously estimated at from 50,000 to 150,000.

Fi'ber, the thread-like portion of animal and vegetable tissues. Asbestos is also considered a mineral fiber. There are many varieties of fibers, and they are used for a large number of purposes, but when the term *fiber* is used without any qualification, it means *textile fiber*. The most important textile fibers are cotton, wool, silk, flax, hemp, jute and ramie, or China grass. Each of these is described under its appropriate title. Wool and silk constitute the only valuable animal fibers, but under the term *wool* is included that obtained from the sheep, the alpaca, the Angora and other species of goat. Paper fibers include those that can be used in the manufacture of paper, but are not suitable for other purposes. The most important of this class are wood fiber and that obtained from Esparto grass and corn husks. Brush fibers include a number of fibers obtained from tropical plants, usually species of palm, and are used in the manufacture of brushes. Palmetto, tampico and cocoa fibers are the most common fibers for this purpose. Broomcorn is classed as a brush fiber by manufacturers. The finest textile fibers are usually grown in the temperate climate. With

this exception, nearly all those of commercial importance are obtained from tropical or semi-tropical countries. See CLOTH; PAPER; WEAVING.

Fi'brin, a peculiar substance found in animals and vegetables. Animal fibrin is the solid matter which is deposited when blood coagulates. In circulating blood it is not solid, but when it is exposed to the air it causes the clot that is seen in wounds. If the wounded blood vessel is small the clot stops the flow of blood. Fibrin is best obtained by switching newly-drawn blood with a bundle of twigs, when the fibrin clings to them in threads. The coloring matter may be washed out with water.

Fichte, *fiK'te*, JOHANN GOTTLIEB (1762-1814), a German philosopher, born at Raumenau, in upper Lusatia. He was the son of a ribbon weaver and spent his early years in poverty, but was fortunate enough to attract the attention of a nobleman, who provided for his preparation for the university. His patron died, however, and Fichte was obliged to support himself at the university as a tutor. In course of time he was appointed professor of philosophy in the University of Jena, which position he held for five years, when he was expelled because he did not believe the doctrines of the Church. Subsequently he was five years professor of philosophy in the University of Berlin. He died from typhus fever contracted while taking care of soldiers who were wounded in the war of 1813.

Fichte's philosophy is founded on the idea that each of us creates his world for himself. In accordance with this idea each individual, in order to exist and have activity, must recognize something other than itself—the *notself*. Experience consists in building up varied forms of the *notself*; that is, in constructing an external world. For the sake of common convenience and because of the need of social life, it is the duty of all individuals to make their worlds as nearly alike as possible; hence, we find ourselves accepting as true the same phenomena and objects of sense. The true self, Fichte declared, cannot be the finite personality, but is the great universal self—God—whose will is everywhere expressed through the wills of finite creatures.

Fichte's addresses and writings exerted a powerful influence over the German nation at one of its most critical political periods. His connection with education consists in his annunciation of the doctrine that education must be an unfolding of the whole nature, moral as well as intellectual. He considered the acquisition

Fiddler Crab

of knowledge the smallest part of education, and believed that the great aim of instruction should be to develop character. To him selfishness was the root of all evil, and his system of education aimed to produce complete and unselfish men. These theories are fully set forth in his *Address to the German Nation*, which, though containing some one-sided views, is of value and is in current use by the best educators.

Fid'ler Crab, a common name for a kind of crab, of which one pincher is very much longer than the other and resembles a violin; hence the name. The male has a large claw, which serves as a useful weapon.

Fief, *feef*. See FEE.

Field, *feeld*, CYRUS WEST (1819-1892), an American merchant, brother of David Dudley Field and Stephen J. Field. He was born at Stockbridge, Mass., and started in mercantile business in New York City. After a disastrous failure he acquired a large fortune, and, having obtained a charter giving him exclusive right for fifty years to land ocean telegraphs on the coast of Newfoundland, he organized an Atlantic telegraph company. Attempts to lay cables were made in 1857 and 1858, but without permanent success, and the Civil war having broken out, it was not until July 27, 1866, that a cable was successfully laid, the largest vessel then

Field

various important railroad enterprises. See CABLE, ATLANTIC.

Field, DAVID DUDLEY (1805-1894), an American lawyer, born in Haddam, Conn. He graduated from Williams College, early displayed remarkable ability in the law and became especially prominent in the cause of law reform. A code prepared by him was the basis of most of the recent state codes and of one adopted in England. Mr. Field rarely entered politics; he served for a short time in Congress as a Democrat, but staunchly supported President Lincoln.

Field, EUGENE (1850-1895), an American poet and humorist, born in Saint Louis, Mo.



EUGENE FIELD



CYRUS W. FIELD

afloat, the *Great Eastern*, being used. Mr. Field took an active part in establishing telegraphic communication with the West Indies and South America and was connected with

Having lost his mother when he was but seven years of age, he was brought up by a cousin, Miss Mary Field French, of Amherst, Mass. He studied at Williams College, was transferred to Knox College, Galesburg, Ill., and completed his education at the Missouri State University. On attaining his majority he left the university and soon afterward made a tour of Europe. On his return to America he found it necessary to turn his attention to earning a livelihood, and his taste for journalism led him into that profession. From contributor to the *Saint Louis Journal*, he rose to the position of city editor, and he was afterward connected with various papers in Saint Joseph, Kansas City, Denver and Chicago. A series of comic and semi-humorous articles published in a Denver paper brought him favor-

able notice, and in 1883 he was given charge of a department in the *Chicago Morning News* (afterward *The Record* and *The Record-Herald*). In this capacity he made a reputation as a humorist by his widely-read column, *Sharps and Flats*. He also came into notice as a lecturer. His propensity for practical joking was well known; sometimes he would amuse himself by writing verses, signing a friend's name and after publication criticising them unmercifully.

Field was a true lover of children, and it is probable that he is most widely known as a poet of childhood. But his poems, while most of them appeal forcibly to children, are rather child poems for older people, as their delicate fancy and blended humor and pathos are often too subtle for children. *Little Boy Blue* and *Sometime there ben a lyttle boy* show Field's mastery of the mingling of humor and pathos; and *Seein' Things*, *Jes' Fore Christmas* and *The Limitations of Youth* reveal his sympathy with the heart of a boy. Among his works may be mentioned *The Model Primer*, *A Little Book of Profitable Tales*, *A Little Book of Western Verse*, *Echoes of a Sabine Farm*, *With Trumpet and Drum* and *The Love Affairs of a Bibliomaniac*.

Field, KATE (1840-1896), an American writer and actress, born at Saint Louis, Mo. She completed her education at Boston and made a visit to Europe as correspondent for the *New York Tribune*, the *Chicago Tribune* and the *Philadelphia Press*. Later she became an actress, but met with no great success. In 1890 she started *Kate Field's Washington*, a journal published weekly in Washington, D. C. Among her works are *Haphazard*, *Ten Days in Spain*, *History of Bell's Telephone* and *Life of Fechter*.

Field, MARSHALL (1835-1906), an American merchant, born at Conway, Mass. He spent his boyhood on a farm, but at the age of seventeen became a clerk in a dry goods store at Pittsfield, Mass., and removed to Chicago in 1856, becoming a partner in a dry goods house, which in 1865 included the three now famous merchants, Marshall Field, Potter Palmer and L. Z. Leiter. Palmer retired in 1867 and Leiter in 1881, Mr. Field becoming head of the firm, which was thereafter known as Marshall Field & Company and which in the next twenty-five years became the largest wholesale and retail dry goods house in the world. Field was a liberal patron of the University of Chicago and founded the Field Columbian Museum as a permanent repository for interesting exhibits at the World's Columbian Exposition of 1893. By his will

he gave the institution about \$8,000,000. He was director of many corporations, including the United States Steel Corporation, the Pullman Company and the Chicago & Northwestern railway company. The bulk of his vast fortune, estimated at from \$120,000,000 to \$150,000,000, was by his will placed in trust for his two grandchildren, aged eight and twelve, respectively, who will not come into full possession of the property until they are fifty years of age.

Field, STEPHEN JOHNSON (1816-1899), an American jurist, born in Haddam, Conn., a brother of David Dudley Field and Cyrus W. Field. He graduated at Williams College in 1837, studied law with his brother in New York City and became his partner. In 1849 he went to California with the gold seekers and exerted notable influence during the period of disorder before the admission of California as a state. After the admission of California he served in the legislature and was influential in the passage of many important laws. In 1857 he became judge of the supreme court of California and two years later became chief justice. President Lincoln appointed him associate justice of the Supreme Court in 1863 and for thirty-four years he served with marked ability. Many of his opinions are important contributions to American constitutional law, notably those in which he dissented from the legal tender, slaughterhouse and income tax decisions. He was a member of the electoral commission of 1876 and voted with the minority in favor of Samuel J. Tilden.

Field Glass, a double telescope, in compact form, usually from six to ten inches long. It is an enlarged opera glass. Some of the more recent patterns contain prisms which so reflect the light coming through the object glass as to increase the distance between this and the eyepiece and in this way increase the power of the instrument. See **OPERA GLASS**.

Field'ing, HENRY (1707-1754), one of the greatest of English novelists, born at Sharpham Park, in Somersetshire. He was educated at Eton, whence he removed to Leyden; but the straitened circumstances of his father shortened his academical studies, and the same cause, added to a dissipated disposition, turned his attention to the stage. His first play, entitled *Love in Several Masques*, was produced at Drury Lane in 1728, and met with a favorable reception. Numerous other plays quickly followed, but although they were fairly well received at the time, they had not the qualities which insure permanent popularity. In 1737

Field Officers

he married Miss Craddock, a lady of some fortune, and at the same time, by the death of his mother, became possessed of a small estate in Dorsetshire. His wife's fortune he soon dissipated, and he was again obliged to depend on his pen for his living. In 1742 appeared the first of his great novels, *Joseph Andrews*, which he had at first conceived as a burlesque of Richardson's *Pamela*. It met with instant success, and was followed by *Jonathan Wild*, a satirical work, which had little interest beyond its own day. In 1749 Fielding's masterpiece, *Tom Jones*, appeared, and this was followed two years afterward by *Amelia*. The chief merits of Fielding as a novelist are wit, humor, correct delineation of character and knowledge of the human heart. He drew from a varied experience of life, which he reproduced with an artistic realism entitling him to be considered, far more than Richardson, the creator of the English novel.

Field Officers, in the army, those competent to command whole battalions—majors, lieutenant colonels, colonels—as distinguished from those intrusted with company duties, as captains and lieutenants.

Field of the Cloth of Gold, the name given to a plain in France, in the present Department of Pas-de-Calais, celebrated for the meeting (June 7 to June 20, 1520) between Henry VIII, of England, and Francis I, of France. The diplomatic results of the meeting were little or nothing, and the event is now memorable only as a grand historic parade. The splendor of the festivities and the gorgeousness of the trappings of the attendant nobles were what gave to the place its name.

Fields, JAMES THOMAS (1817–1881), an American publisher and author. By reason of his great sympathy with young authors and his keen literary judgment, he became an intimate friend of Longfellow, Whittier, Bryant, Hawthorne, Holmes, Emerson, Lowell and many other writers, and his firm, which was known at different times as Ticknor & Fields and Fields, Osgood & Co., published most of their books. Mr. Fields was editor of the *Atlantic Monthly* from 1862 to 1870. After retiring from business, he published a volume of poems and also *Yesterdays with Authors*, a charming book of reminiscences of the author's acquaintance with Thackeray, Hawthorne, Dickens, Wordsworth and others.

Field Sports. See **ATHLETICS**.

Fifteen Decisive Battles

Fi'ery Cross, among the Scottish Highlanders, a cross of light wood, the extremities of which were set afire and then extinguished in the blood of a goat. This cross was sent from place to place as a summons to arms and was also known as the *Crantara*.

Fife, a small wind instrument, resembling the flute. Its tube is closed at one end and is pierced with six finger holes. It sometimes has one key. The player blows into a hole near the closed end of the tube, and the music produced is extremely clear and shrill. The fife is commonly used with the drum. Its ordinary compass is two octaves, from D on the fourth line of the treble staff upward.

Fifteen Decisive Battles. The English historian Sir Edward Creasy, in *The Fifteen Decisive Battles of the World*, describes the following as the battles which have been instrumental in changing the course of history:

(1) **MARATHON** (490 B. C.). In this, the Greeks under Miltiades defeated Cyrus, the Persian king, and thus rendered impossible the conquest of Europe by Asiatic peoples. See **MARATHON**.

(2) **SYRACUSE** (413 B. C.). In this the Athenians were overthrown and the extension of Greek rule was checked. See **SYRACUSE**.

(3) **ARBELA** (331 B. C.). Alexander the Great by his victory over Darius made possible the introduction of European civilization into Asia. See **ARBELA**.

(4) **METABURUS** (204 B. C.). This battle was the defeat of Hannibal by the Romans and brought about the destruction of Carthage.

(5) **ARMINIUS** (9 A. D.) defeated the Roman general Varus, destroyed his legions and thus overthrew Roman dominion in Germany. See **ARMINIUS**.

(6) **CHALONS** (451). Here the defeat of Attila by the Visigothic king Theodoric saved Europe from devastation at the hands of the Huns. See **CHALONS-SUR-MARNE**.

(7) **TOURS** (732). In this battle Charles Martel defeated the Saracens and checked the spread of Mohammedanism in Europe. See **TOURS**.

(8) **HASTINGS** (1066). In this battle William the Conqueror defeated Harold and won for himself the English throne and for the Normans the control of England. See **HASTINGS**, **BATTLE OF**.

(9) **ORLEANS** (1429). In this battle Joan of Arc, by her defeat of the British and the relief of the town, made possible the libera-

tion of France from British dominion. See ORLEANS.

(10) ARMADA, The (1588). The defeat of the Spanish Armada was fatal to Spanish hopes in England. See ARMADA.

(11) BLENHEIM (1704). Here the duke of Marlborough by his defeat of the French army checked the ambitious schemes of Louis XIV of France. See BLENHEIM.

(12) PULTOWA (1709). Here Peter the Great defeated Charles XII of Sweden and firmly established the Russian empire. See CHARLES XII.

(13) SARATOGA (1777). The defeat of the English under General Burgoyne by the American troops under General Gates turned the tide of the Revolution in favor of the colonists. See SARATOGA, BATTLE OF.

(14) VALMY (1792). The French won the victory against the armies of the allies under the duke of Brunswick, and the continuation of the French Revolution was made possible. See VALMY.

(15) WATERLOO (1815). Napoleon I was finally overthrown by the allied armies under the Duke of Wellington. See WATERLOO, BATTLE OF.

Historians differ somewhat in their choice of the most decisive battles of the world's history, but the ones mentioned above have certainly strongly influenced the course of history.

Fig, a tree belonging to the mulberry family. It is indigenous to Asia Minor, but has been naturalized in all the countries round the Mediterranean. It grows from fifteen to twenty, or even thirty, feet high, and in congenial climates it bears two crops in a season, one in the early summer, from the buds of the last year; the other (which is the chief harvest) in the autumn, from the buds on the spring growth. In reality, the fig is the pulpy end of a stem, which has grown around and nearly enclosed the real fruits, which we call the seeds. When ripe, figs are dried, and sugar forms on the outside; they are then packed in boxes for market. The best are raised in Smyrna, but good figs are produced all around the Mediterranean. Figs can be successfully grown anywhere in the United States south of the fortieth parallel, but as an industry fig-growing is most extensive in California, whose figs are now said to rival those of Smyrna. To the same genus belong a number of tropical plants which are both curious and valuable. Some are trailing vines,

while others are great trees. East India rubber is made from the sap of a fig tree.

Figaro', a dramatic character first introduced on the French stage by Beaumarchais in his comedies, *The Barber of Seville* and *The Marriage of Figaro*. Figaro is a barber remark-



FIG

Female flowers and fruit.

able for his shrewdness and dexterity in intrigue. Mozart's *Marriage of Figaro* and Rossini's *Barber of Seville* are adaptations of these plays. The name is also well known as that of a journal published in Paris.

Fighting Fish, a small fish related to the perch family, a native of the southeast of Asia. In Siam these fishes are kept in glass globes, as we keep goldfish, for the purpose of fighting, and an extravagant amount of gambling takes place about the results of the fights. When the fish is quiet, its colors are dull, but when it is irritated it glows with metallic splendor.

Fighting Joe, a nickname given to Gen. Joseph Hooker.

Fig'urate Num'ber or **Fig'ural Num'ber**, a number whose units can be arranged in the form of a geometric figure. In the accompanying table the numbers in the second row are called *triangular* numbers, because their units may be arranged in equilateral triangles. The numbers in the third row are called *square* numbers, those in the fourth, *pentagonal*. In

the same way, according to a fixed law, series of hexagonal and heptagonal numbers may be derived. In general, these are called polygonal numbers.

I.—1	2	3	4	5	6
II.—1	3	6	10	15	21
III.—1	4	9	16	25	36
IV.—1	5	12	22	35	51

Figures of Speech, a term used, in its widest sense, to mean a use of words in any but their literal meaning. Such figures may be divided into three classes, figures of rhetoric, figures of etymology and figures of syntax. *Figures of rhetoric* differ from the others in being figures of thought, rather than of grammatical form, and are used more constantly in poetical than in prose composition, as when skillfully used they add greatly to the beauty of language. The two most common figures of rhetoric are the metaphor and the simile (See METAPHOR; SIMILE). The *figures of etymology* have reference to the forms of words and consist largely in the use of such forms as *o'er* for *over* and *twixt* for *between*, while *figures of syntax* are variations in the construction of sentences. The most common figure of syntax is the ellipsis, by which is meant the omission of some word, phrase or clause which is essential to the grammatical completeness of a sentence, but which is omitted with the intention of making an expression more forcible. This figure is common in ordinary speech, and every such expression as *Here!* for *Come here!* *Less noise!* for *Let there be less noise!* is an example of ellipsis.

Fiji, *fe'jee*, **Islands**, or **Viti**, *ve'tee*, **Islands**, an island group forming a colony of Great Britain, in the South Pacific Ocean, east of the New Hebrides. The entire group, which was discovered by Tasman in 1643, comprises altogether 254 islands and islets, 80 of which are inhabited, with a total area of about 8000 square miles. Only two of the islands are of large size, Viti Levu, or Naviti Levu, and Vanua Levu, or Vuya. The islands are mostly of volcanic origin, and the surface is mountainous. The soil is extremely fertile and produces coconut palms, breadfruit, bananas, pandanus, oranges, taros, yams, sweet potatoes, maize, tobacco and sugar cane. Timber trees, including the chestnut, are plentiful; sandal wood is now scarce. The chief occupation is agriculture. From 1866 onward the influx of European settlers from New Zealand and the Australian colonies gradually brought the trade of Fiji into importance, and repeated applications were

made to the British government, both by the settlers and the king, Thakombau, to annex the islands. At length, in 1874, this was done, and the Fiji Islands were made a crown colony, under a governor, assisted by an executive council and legislative assembly. Native chiefs take part in the administration, the old customary law being still largely adhered to. Since the annexation the prosperity of the colony has been remarkable. The chief article of export is sugar; the next is copra, the dried kernels of the coconut. The other important exports are cotton, molasses and coffee. The capital is Suva, on the south coast of Viti Levu. The island of Rotumah, to the north, was annexed to Fiji in 1881. The inhabitants are of middle stature, strongly built, with a complexion between copper color and black, and for many years have been Christians. Population in 1911, 139,541.

File, a steel tool for abrading or smoothing purposes. Files were known before 1093 B. C., for they are mentioned in *I Samuel* xiii, 21. Files are graded by shape, size and fineness of cut. Three distinct "cuts" of file are recognized, *single-cut*, *double-cut* and *rasp*. These cuts have different degrees of coarseness, designated by terms as follows:

Single-cut: rough, coarse, bastard, second-cut, smooth. *Double-cut*: coarse, bastard, second-cut, smooth, dead smooth. *Rasp*: coarse, bastard, second-cut, smooth.

The terms *rough*, *coarse*, *bastard*, *second-cut*, *smooth* and *dead smooth* have reference only to the coarseness of the teeth; the terms *single-cut*, *double-cut* and *rasp* refer to the character of the teeth. In single-cut files, the coarse grades of which sometimes are called *floats*, the teeth are unbroken, the *blanks*, that is the pieces of steel of which the files are made, having had but a single course of chisel cuts. Double-cut files have two courses of chisel cuts crossing each other. Rasps differ from single- and double-cut files in that the teeth are disconnected, each being made with a single pointed tool, called a *punch*. A *safe edge* is a side of the file which has no teeth on it and is used for filing in a corner, without cutting more than one of the work surfaces. A file is *taper* when it is thinner toward the point; *parallel* when it is of the same dimensions throughout, and *blunt* when it is between a taper and a parallel.

Most of the files used to-day are machine-cut. The blanks are fed into the machine, and the feed is so regulated that a new cutting surface is presented at regular intervals to the

Filefish

chisel. For years inventors tried to make a machine which would cut files to equal the hand-cut files, but the cuts were too regular, both as to distance and height. This put all the work on the part of the file presented first to the work. But the machines used in the United States not only give the file that irregularity of cut necessary, but raise burs which cannot be told from those of hand-cut files.

Filefish, a name given to certain fishes, from the fact that the dorsal spine is granulated like a file. One species, a common inhabitant of the Mediterranean, which grows to the length of two feet, has the power of inflating its sides at pleasure. The best-known filefish is the *barnacle eater*, found north of England. It is of a tawny color and is often seen in aquariums. These fishes are related to the trigger fishes.

Filibusters, a name given to those who, as private citizens of one country, interfere in the affairs of another, especially in time of war. The name has been chiefly used to refer to those citizens of the United States who endeavored to establish settlements in the Spanish islands and colonies in Central America, and also to those who had illicit intercourse with the insurgents during the rebellions of the Spanish colonies. Among the most noted of the filibusters was William Walker, who made three expeditions to Nicaragua (1855, 1857 and 1860).

Filipinos, *fil e pe'noze*. See PHILIPPINE ISLANDS.

Fillet, in architecture, a small space or band, like a narrow ribbon, used with moldings; *a, a, a* (see figure) are examples of fillets, both in classic and Gothic architecture.

Fillmore, MILLARD (1800-1874), an American statesman, thirteenth president of the United States, born at Summer Hill, N. Y. The poverty of his parents prevented his having a good education, and at fifteen he was an apprentice to a wool carder, with whom he remained four years. Meantime, he spent every spare moment in reading and study. A lawyer named Wood became interested in him, and when Fillmore was nineteen took him into his office to study law, placing at his disposal funds for the prosecution of his studies. Fillmore devoted part of his time to conducting a school. In 1821 he removed to Buffalo, where, in 1823, he was admitted to the bar. In 1829 he was chosen as an Anti-Mason representative in the state legis-



FILLETS

Filter

lature and procured the passage of a bill abolishing imprisonment for debt in New York. In 1832 he became a Whig member of Congress and was reelected several times. He was the author of important legislation, notably the tariff of 1842 besides being conspicuous as a



MILLARD FILLMORE

debater. In 1847 he was elected comptroller of New York; in 1848, vice-president of the United States, and in July, 1850, by the death of President Taylor, he became president. He held this office until 1853. The passage of the Omnibus Bill, or Compromise of 1850 (See COMPROMISE OF 1850), was the most notable event of his administration and was due largely to his sympathetic assistance. In 1856 he was the candidate of the Know-Nothings for president, but received only the electoral vote of Maryland. See UNITED STATES OF AMERICA, sub-head *History*.

Filter, a device for taking dirt and other impurities out of liquids. Spring water is purified by being filtered through beds of sand and gravel in the earth; but rain water and that obtained from lakes and rivers need to be filtered before using. A common filter is made of two vessels; one within the other, or one above the other. The vessel used for the filter is partially filled with alternate layers of powdered charcoal and sand, with a layer of coarse gravel on top. The bottom of this vessel may

be porous, or it may contain an opening through which the water can run. The water is poured into the filter and slowly flows down through the sand and charcoal and collects in the other vessel, from which it can be drawn for use. Charcoal made from bones, called animal charcoal, is the best purifier for cleansing water, as it removes not only the solid matter but any gases which the water may contain, as well. The Pasteur filter, so common in city houses, consists of a vessel of very thin porous earthenware, enclosed in a metallic tank, which can be fastened to the faucet or water pipe. The pressure forces the water through the filter, and the pure water is drawn from a spigot connected with the tank. Waterworks of many cities have large filters connected with them. Filters used by chemists are made of paper, especially prepared for the purpose.

Finch, a general name for any individual of a large family of small seed-eating birds, inhabiting all parts of the globe and distinguished by their sharply pointed, conical and usually strong bills, suitable for crushing seeds and other hard objects. There are about 550 species, which have been classified into several sub-families and many genera. Though most of them are sober in their coloring, some are particularly brilliant, and many of them are fine singers. See CANARY; CHAFFINCH; GOLDFINCH; BULLFINCH; BUNTING; CROSSBILL; GROSBEAK; LINNET; SPARROW; SNOWBIRD, and articles on numerous other species.

Findlay, OHIO, the county-seat of Hancock co., 44 mi. s. of Toledo, on the Blanchard River and on the Lake Erie & Western, the Cincinnati, Hamilton & Dayton, the Big Four and several other railroads. The city is in a region having many oil and natural gas wells, besides deposits of coal, building stone, lime, sand and gravel. The varied industries include machine shops, oil refineries and manufactures of glass, brick and tile, carriages, furniture and other articles. Findlay was incorporated in 1837. It has a public library and a hospital and is the seat of Findlay College, which is under the auspices of the Church of God. Population in 1910, 14,858.

Fine, a pecuniary penalty, exacted either in punishment of, or in compensation for, an offense, whether committed against an individual, in contravention of the laws of the community, or against the community itself.

Fine Arts, the arts which appeal to the sense of beauty and whose object is to produce

pleasure. Of the fine arts, music is the first and purest, because the sources of pleasure in it are purely artistic. It tells no story, represents no fact, but simply gratifies the sense of beauty and excites pleasure. In the modern sense the fine arts are only the imitative arts, which appeal to us through the eye, and the term is often restricted to painting and sculpture. See ARCHITECTURE; ENGRAVING; PAINTING; SCULPTURE.

Fin'gal's Cave, a famous natural cavern in the island of Staffa, one of the western islands of Scotland. It extends 227 feet from its mouth inward and is flanked by lofty basaltic columns, beautifully jointed. The height from the top of the arched roof to the mean level of the sea is 66 feet, the breadth at the entrance is 42 feet and the width at the end of the cave is 22 feet.

Fin'ial, in architecture, the terminal ornament of pinnacles, canopies, spires or pediments. Finials were generally carved to resemble foliage and were made of stone, wood or metal. They reached their highest development of form and design in the thirteenth century in France and England.

Fin'land, a Russian grand duchy, bounded on the n. by Norway, on the e. by the governments of Olonetz and Archangel, on the s. by the Gulf of Finland and on the w. by Sweden and the Gulf of Bothnia. It embraces a large part of Russian Lapland. There are many small islands and rocks off the coast, which make navigation extremely difficult and dangerous. The surface is diversified with hills, and in the north are mountains, peaks of which rise as high as 4000 feet. The soil is fertile, producing extensive forests of oak, pine and fir and considerable rye, oats and potatoes. The most valuable exports are the products of the forests, timber, pitch, tar and resin. The principal minerals are iron and copper; granite is extensively quarried. The inhabitants are mostly Finns and Swedes, with a few Lapps, Russians and Germans. Up to the twelfth century the Finns lived under their own chiefs and were pagans. Their conversion to Christianity took place about the middle of that century, after their conquest by the Swedes. In 1721 the part of Finland which formed the province of Viborg was secured to Peter the Great by treaty and the remainder was conquered from the Swedes in 1809. The religion, laws and liberties of the country have, however, been preserved, and Finland is perhaps the freest part of the Russian Empire. The established religion is Lutheran,

but there is complete religious freedom for other bodies. The parliament includes representatives of the nobles, the clergy, the burgesses and the peasants, convoked by the grand duke, the emperor of Russia. The superior administrative power is in the hands of the Senate, which is nominated by the crown and sits at Helsingfors, the capital, under the presidency of a governor-general representing the emperor. The governor-general is usually a Russian and is appointed by the emperor. The czar is supreme sovereign and issues edicts which have the force of national law. Population in 1910, 3,120,264.

Finland, GULF OF, a great arm of the Baltic, 250 or 260 miles long and from 10 to 70 miles wide, stretching from west to east between Finland on the north and the Russian governments of Esthonia and Petrograd on the south. Its waters are only slightly salt. It contains numerous islands and has several excellent harbors and strong fortresses. Navigation is possible, but is impeded by the rocks and sandbanks and the ice in winter. The ports on this gulf are Kronstadt, Viborg and Helsingfors.

Finns, a race of people inhabiting the north-western part of European Russia, especially the grand duchy of Finland. The typical Finns are of low stature but of strong build, with round head, low, arched forehead, flat features, with prominent cheek-bones and oblique eyes. Their language belongs to the northern division of the Turanian family of languages and is most nearly allied to the languages of the Lapps and Hungarians. It is agreeable to the ear, rich in vowels and diphthongs, copious and uncommonly flexible. Finnish literature is valuable chiefly for its rich stores of national poetry (See KALEVALA). A great impulse has been given to the cultivation of the language in modern times. It is now recognized as an official language, side by side with Swedish, and is becoming more and more the vehicle for imparting instruction. In many of the higher educational institutions for both sexes in Finland, the Finnish language is used. Works on science and history, as well as poetry, have been written in Finnish in recent years; a great Finnish-Swedish dictionary has been published, and there are now a considerable number of newspapers. The center of this literary life is Helsingfors.

Fins, the projecting, wing-like organs which enable fishes to balance themselves and which assist in regulating their movements in the water. The fin is a thin, elastic membrane, supported by bony or cartilaginous rays. The breast fins

are never more than two and are placed immediately behind the gill. In a state of rest these fins are drawn in parallel with the body and have the apex toward the tail. The terminal fins are located under the throat and belly and point downward and backward. They are smaller in general than the breast fins and sometimes have long appendages. The fins of the back point upward and backward and vary in number from one to four, to which are sometimes added several little fins, as in the case of the mackerel. Other fins are placed vertically near the tail. The tail fin, which terminates the body and serves as a rudder, assists in propelling the fish. The shape, location and character of the fin vary with different genera.

Fin'sen, NIELS RYBERG (1861-1904), a Danish scientist, the discoverer of the method of curing lupus, or tuberculosis of the skin, and other skin diseases, with light rays. In 1890 he graduated from Copenhagen University and began at once the research which led to his wonderful discoveries. The value of his work was so well recognized that the Danish government assisted him to establish Finsen's Medical Light Institute, in a suburb of Copenhagen, where he labored to perfect his methods of applying light to the treatment of disease. In 1903 Professor Finsen received the Nobel medical prize.

Fiord or Fjord, *fyord*, a geographical term (of Scandinavian origin) applied to long, narrow and very irregularly-shaped inlets of the sea, such as occur on the coast of Norway. Similar inlets of the sea are presented in the sea lochs and firths of the coast of the British Isles, and also in the fiords on the southwest coast of the South Island of New Zealand, where the scenery is singularly imposing. Fiords often seem to owe their origin to the action of glaciers in remote epochs of the earth's history.

Fir, *jur*, the name of a tree belonging to the family Coniferae. The fir, which is closely related to the pine, resembles the spruce in general appearance and is distinguished by its sharp, flat leaves, which are dark green on the upper surface and light on the under, and which grow in rows on opposite sides of the branch. A typical tree is beautifully cone-shaped, and in young specimens the lowest branches touch the ground. There are a number of species, most of which are found in cold climates throughout the eastern and western hemispheres. In the United States the *balsam fir* is the common eastern species, found in abundance from Hudson

Bay to Virginia and westward as far as the Great Lakes and Minnesota. This tree seldom grows to more than thirty feet in height and produces an inferior timber. Canada balsam is prepared from the sap of this tree, and the buds have a fragrant and soothing odor. The fir of the Pacific states is known as the *silver*, or *low-land*, fir, a gigantic tree, often reaching a height of 300 feet and furnishing white soft wood that is used for boxes, barrels and for some building purposes. The *red fir* of the same region is of much the same character. In 1910 nearly 2,000,000 board feet of fir timber were cut on the Pacific coast. Its value was about \$18,000,000.

Firdausi, *feer dow see'*, or **Firdusi**, *feer doo-see'*, ABUL KASIM MANSUR (about 935-1020), the greatest epic poet of the Persians. At the request of the Sultan Mahmud, Firdausi undertook to write an epic on the history of Persia, the sultan promising him a piece of gold for each verse. Firdausi devoted a great many years to this work and produced a historical poem of 60,000 couplets, entitled *Shah-Namah*, or *Book of Kings*, containing the history of the Persian rulers from the beginning of the world to the downfall of the Sassanian dynasty (641 A. D.) and consisting properly of a succession of historical epics. The sultan, prejudiced against Firdausi by the poet's enemies, gave him only a piece of silver for each verse, and Firdausi retaliated with one of the bitterest and severest satires ever penned. The *Shah-Namah* is one of the finest Asiatic poems. No other work in the Persian language can be compared with it. It abounds in rich imagery, contains many passages of splendid poetry and is of great interest to historians and ethnologists. A French translation of the *Shah-Namah* by Mohl, with the Persian text, was published by the French government, and an abridged translation has been published in English.

Fire. In the mythology of most nations there is recognized a time when man was without a knowledge of fire, and the various legends of the discovery of fire are interesting and varied. The uses and dangers of fire, and to some extent the means of controlling it, have been generally understood from a very early period. The symbolic and superstitious uses of fire are numerous and have been, or are, common to all races. In ancient times fire was regarded as one of the four elements of which all things are composed, the other three being air, earth and water.

Fire Alarm', an apparatus for announcing the breaking out of a fire. Simple fire alarms

are often placed in large buildings. These are usually automatic and are so constructed that a rise in temperature beyond a given point closes the circuit which operates an electric signaling apparatus; but the fire alarm in most common use is that connected with the fire departments of cities. This consists of a central office, or signal station, containing the batteries and signal bells, which are connected with alarm boxes stationed at different places in the city. The alarm boxes are of iron and are closed with two doors. When necessary to "turn in" an alarm, the box is opened, and the handle, which is either a crank or a hook, is pulled down. This turns a wheel which closes the circuit and rings the gong in the central office and another in the engine house in the district in which the alarm box is located. The gong gives a number of strokes corresponding to the number of the box from which the alarm is sent in, and at the same time a recording apparatus in the central office indicates the number of strokes. If additional alarms are required, they are sent from the central office.

Fire'arms. See ARMS AND ARMOR; CANNON; GUN; MACHINE GUN; MUSKET; PISTOL; REVOLVER; RIFLE; SHOTGUN; SMALL ARMS, and other kindred titles.

Fire'ball, 1, A ball filled with powder or other combustibles, intended to be thrown among enemies and to injure by explosion, or to set fire to their works. 2, A popular name applied to a certain class of meteors, which exhibit themselves as globular masses of light, moving with great velocity and infrequently passing unbroken across the sky until lost in the horizon. They differ from ordinary meteors, probably, more in volume and brilliancy than in any other distinctive characteristic. They are not to be confounded with another class of meteors that explode in their passage and appear to let fall a dull red body to the earth. See METEOR.

Fire'bird. See BALTIMORE ORIOLE.

Fire Clay, a compact kind of clay, consisting chiefly of silica and alumina, capable of sustaining intense heat and used in making fire bricks, gas retorts and crucibles, and for lining blast furnaces. Fire clay belongs to the coal formation and always forms a stratum immediately below each seam of coal. See CLAY.

Fire'crackers, toy bombs, consisting of cylinders of paper, enclosing an explosive powder, which is ignited by a fuse projecting from one end. The Chinese or Hindus were the first

Fire Damp

makers of fireworks, and probably gunpowder or something like it was burned on festival days several thousand years ago in China. Americans began to make firecrackers only a few years ago, but at the present time they are turned out by the millions. They range in size from about $\frac{1}{2}$ an inch to more than 1 foot in length, and from $\frac{1}{8}$ of an inch to 3 inches in thickness. The tube of the cracker is made of strawboard, the fuse is spun cotton, soaked in a mixture of starch and gunpowder, and the explosive is a mixture of powdered charcoal, bichromate of potash and chlorate of potash. They should be handled with the greatest care, should not be touched after lighting and should be made to explode at a considerable distance from any person. Lock-jaw and blood poisoning frequently follow as the result of wounds caused by explosions. In cases of injuries immediate steps should be taken to cleanse the wound, and antiseptic substances should be applied under the direction of a physician.

Fire Damp, the name given by miners to light, carbureted hydrogen gas, marsh gas or methane. It appears to be generated by the decomposition of partially carbonized coal. It is sometimes very abundantly evolved in coal mines and is frequently productive of the most dreadful results, for if mixed with air it is highly explosive and takes fire readily from an exposed flame. In many cases it has occasioned the death in one great explosion of hundreds of men employed in a mine. The safety lamp affords the chief protection against the fatal effects of this gas. See DAVY, SIR HUMPHRY.

Fire Department, the organization and appliances for extinguishing fires. The fire department of a large city is a highly organized body, under the control of a chief and several assistants. It is usually divided into companies, each under the immediate control of a captain. One or more of these companies occupy a fire station, where also the fire engine, hose cart and other material are kept. When an alarm of fire sounds, the horses are released and the doors to their stalls are opened by electrical devices. The horses are trained to take their places at the pole, and the harnesses which are suspended over these positions are released and instantly clasped in their proper places. Within a few seconds from the time the alarm is sounded, the men have reached the engine and hose cart by sliding down poles from the loft above, and the company is ready to start. On reaching the scene of the fire the engine is connected by hose

Fire Extinguisher

with the hydrant of the waterworks, and other hose is stretched from the engine to the burning building. Through this, water is pumped upon the flames. Ladders, water towers and chemical engines are also used.

In some villages and small cities so-called *volunteer* departments are maintained. The members donate their services, though they are often granted a remission of part of their taxes in return. Though employed in ordinary occupations, they assemble at the alarm of fire and get the apparatus into position and manage the fighting of the flames. See FIRE ENGINE.

Fire Engine, an engine for throwing water to extinguish fires. A fire engine is simply a strong force pump, with the necessary machinery for working it and supplying it with water. The older types of fire engines were worked by hand, and the majority of the fire company gave their attention to working the pumps. Now nearly all fire engines are operated by steam. The engine consists of two pumps attached to a steam engine and the whole mounted upon a wagon. The water is carried to the fire through rubber tubes about four inches in diameter, called *hose*. Several hundred feet of hose usually accompany every engine. The largest fire engines will pump 900 gallons a minute and throw a stream of water as high as a four or five story building, while the smallest size will throw about 300 gallons a minute. In small cities and towns waterworks have replaced the old hand engine, but in cities the steam engine is found necessary.

Fire Escape, a contrivance for enabling people to escape from the upper part of a building when it is on fire. Many patterns of fire escapes have been placed in use during the last half century. The most common pattern consists of an iron ladder, attached to the building, with a platform or balcony at every story. Fire departments use systems of extension ladders, as well as tubes made of sailcloth, through which persons can make an easy descent. All states have stringent laws requiring all factories and buildings of a public nature to be equipped with fire escapes.

Fire Extinguisher, an apparatus for extinguishing fire by means of water charged with gases that kill flame. The fire extinguisher consists of a cylinder which will hold four or five gallons. When the cylinder is charged it is filled with water, into which is put about a pound of common cooking soda. A bottle holding about half a cup of sulphuric acid is fastened

in a frame which is attached to the cup. When the cup is screwed in place the extinguisher is ready for use. When the extinguisher is wanted the bottle is emptied by pulling a rod which passes out through the cup. The acid acts upon the soda in the water and sets free a large quantity of carbonic acid gas, which creates a pressure and forces the water out through small holes at the bottom of the cylinder. Fire extinguishers are useful in extinguishing small fires. A larger pattern, sometimes called the chemical fire engine, usually furnishes a part of the equipment of the fire department of large cities.

Fire-fly, a name given in an indefinite way to any winged insect whose body gives off light in the darkness. The fireflies of the United States are beetles, which may be seen flying in great numbers over wet and swampy places in summer nights. Some of the tropical fireflies are very brilliant (See **CLICK BEETLE**). The larvae of many fireflies give off light and are known in the United States as glowworms.

Fire Insurance. See **INSURANCE**.

Fireless Cooker, a device for cooking food with the minimum expenditure of heat. It consists of a box which can be tightly closed, and which is stuffed with hay or some other like substance, space being left for one or more covered kettles. The food is boiled for a few minutes, until it is heated through, and is then covered and placed in the cooker, which keeps in the heat and allows the food to cook slowly. Meats which are not the more tender cuts; vegetables which require long cooking, as cabbage or dried beans; hard cereals, as rice or cracked wheat, are improved by cooking in a fireless cooker, and are far more economically prepared.

Fire-proofing. See **BUILDING**.

Fire Ships, old vessels filled with combustibles and fitted with grappling irons, to hook enemies' ships and set them on fire. This ancient device has been frequently tried in modern warfare, though it can never be of much effect when employed against modern armored ships.

Fire-works, preparations in various shapes of gunpowder, charcoal, sulphur, saltpeter and other substances, used for display at times of public rejoicing. They may be divided into simple hand pieces, such as squibs, crackers, rockets and Roman candles, and arranged "pieces," which are contrived with much skill and ingenuity to represent, when ignited, various devices and pictures. See **FIRECRACKERS**.

Fire Worship. See **GHEBERS**; **PARSEES**.

First Aid to the Injured. The first and absolutely essential thing to do in case of serious accident or injury is to summon a reliable physician, but often before his arrival steps may be taken which will be of very great benefit to the patient. These will be found described in special articles upon the emergencies which are of most frequent occurrence. Thus, the antidotes for common poisons are described in the article **ANTIDOTE**. See, also, **BURNS AND SCALDS**; **ARTERY**; **VEINS**; **DROWNING**; **SUN-STROKE**; **WOUNDS**; **FAINTING**.

Fish, **STUYVESANT** (1851-), an American capitalist and railroad president, born in New York, the son of Hamilton Fish, former secretary of state. He was educated at Columbia and entered the office of the Illinois Central railroad company in 1871. He rapidly rose to influential positions, meantime serving in various capacities with other roads, especially in the South. In 1887 he became president of the Illinois Central railroad. He was appointed a member of the monetary commission created by the conference in Indianapolis in 1897.

Fish Ber'ry. See **COCCULUS**.

Fish Commission, UNITED STATES, THE. See **FISH CULTURE**.

Fish Culture. Germany, Spain and other countries maintain fish culture establishments under government supervision, and from them millions of eggs and small fish are annually placed in the streams and lakes. In the United States fish culture is under the general supervision of the United States Fish Commission, which maintains hatcheries in different parts of the country, looks after the preservation of fish in waters not under the control of the states, such as the deep waters of the Great Lakes, and sees that such waters are properly stocked with fish. Besides the United States Fish Commission, nearly every state maintains a state commission, whose duty it is to see that the waters within the state are kept stocked with native fish. These commissioners often maintain state hatcheries. The national government and the various state governments have enacted stringent laws regulating the time and manner of taking fish, and it is a part of the duty of these various commissions to see that these laws are enforced. The United States commission also gives attention to the culture of oysters, lobsters and other shellfish valued for food.

Fish'eries, a term which includes all the industries concerned in the capture of the

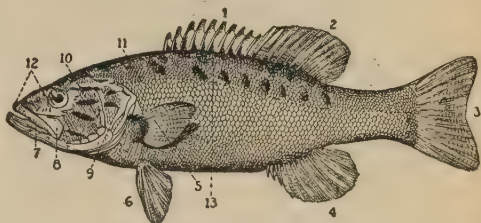
Fishes

inhabitants of fresh and salt water for food and other economic purposes. It is thus applied to the procuring not only of fish proper, but also of other animals and products found in the sea, such as sponges, corals, pearls, shell-fish, turtles, whales and seals. The most important of fresh water fisheries are those of the salmon. The whitefish and sturgeon are also important. Trout, eel, pike and perch are among the other valuable fresh water fishes. Sea fisheries, including the herring, cod, haddock and other fishes, are prosecuted in a variety of ways. Fisheries have generally been considered so important a factor in national wealth that governments have been careful to protect and encourage them in various ways. The right to various fisheries has often been a matter of international dispute, negotiation and treaty. Fisheries belonging to particular governments, especially inland fisheries in lakes and rivers, are also frequently protected by laws relating to the mode and time of capture, which vary with the particular circumstances. The countries whose fishing industries produce the most valuable returns are the United States, Great Britain and Canada. The banks of Newfoundland are among the richest fishing grounds in the world and are largely frequented by United States, Canadian, English and French fishermen. The North Sea also yields a very rich harvest to the fishermen of all the surrounding coasts, especially in herring, cod, haddock and flatfish (See DOGGER BANK). The fisheries of the United States are located along the Atlantic coast, in the Great Lakes and upper rivers of the country and along the Pacific coast. The cod are the most important fish taken from the Atlantic; the whitefish, sturgeon and the species of trout known as Michigan herring are the most important fish taken in the Great Lakes, while the Pacific coast is noted for its salmon fisheries, which are of great value. See COD; SALMON; FISH CULTURE; FISHES.

Fish'es are the lowest of the five classes into which the great branch of vertebrate animals is divided. Fish live in water and breathe the air contained therein by means of gills (see GILLS). They have cold red blood and a simple heart. Their limbs are represented by fins; their bodies are generally covered with scales overlapping one another, and in form they are usually lengthened, compressed and tapering toward both extremities, so that they present little resistance to the water. The vertebrae are loosely articulated, so that the fish can bend

Fish Hawk

their bodies about in almost any direction. They possess, in their air bladder, or *sound*, an organ peculiar to themselves, which they are able to fill or empty at will. The skeletons of some families of fishes are not of bone, but of a strong, thick cartilage. Geology shows that there have been many thousands of species of fish now wholly extinct, but yet about 9000 species survive, distributed throughout almost all the waters of the earth. Those in temperate or tropical waters are more brilliantly colored and strikingly marked than the inhabitants of colder waters. In most species the colors



SMALL-MOUTHED BLACK BASS

- | | |
|---------------------------------|---------------------------|
| 1. Spiny portion of dorsal fin. | 7. Mandible or lower jaw. |
| 2. Soft portion of dorsal fin. | 8. Maxillary. |
| 3. Caudal fin. | 9. Opercle. |
| 4. Anal fin. | 10. Cheek and Preopercle. |
| 5. Pectoral fin. | 11. Lateral fin. |
| 6. Ventral fin. | 12. Snout. |
| | 13. Depth. |

increase in intensity and beauty during the breeding season, much as the plumage of a bird grows bright. The eggs of fish are laid in shallow water and are usually left uncared for, though some species gather the eggs in nests and protect and care for their young. Millions of eggs are laid by a single fish, but the young are such helpless little things that relatively few survive. See FISHERIES; ANGLING; FISH CULTURE; and many articles on separate species.

Fishes, DEEP SEA. Before 1872, when the British government sent out the Challenger expedition, deep sea fishes were not known to any great extent, although the explorations of a few scientific expeditions of earlier date had taught scientists that there were remarkable and astonishing forms of animal life in the ocean depths. The absence of sunlight, the low, even temperature, the enormous pressure and the absence of plants all tend to establish in the denizens of these seas many peculiarities.

Fish Hawk, a well known bird of prey, also called the *osprey*, *fishing hawk*, *fishing eagle* and *sea gull*. It is found on both the European and American continents, near the shores of the sea or on great rivers and lakes. It nests in high trees and cliffs and lives on fish,

Fishing

which it captures by pouncing upon them as they swim near the surface. The general body color is a rich brown, and its tail is banded with brown and white, or in old birds is pure white. The head and neck are whitish in their upper portions, and a brown strip extends from the bill down each side of the neck. The under



OSPREY

parts of the body are whitish, but the legs have a bluish cast. The fish hawk is about two feet in length and measures four feet from tip to tip of its wings. It is said that the American bald eagle often pursues the fish hawk and frightens it into dropping its prey, which is thereupon seized and eaten by the pursuer.

Fish'ing. See ANGLING.

Fishing Laws. See GAME LAWS.

Fiske, JOHN (1842-1901), an eminent American historian, lecturer and philosopher, born at Hartford, Conn. As a boy Fiske was noted for his precocity; he could read and enjoy Shakespeare and Milton at eight; and before he was thirteen he knew Vergil, Tacitus, Horace and other Latin authors well. He graduated from Harvard and from the Harvard Law School, but he did not practice law. From 1869 to 1879 he was connected with Harvard University in one way or another, occupying the positions of lecturer on philosophy, instructor in history and assistant librarian. In 1884 he became professor of American history in Washington University, Saint Louis.

Fiske was early attracted by the writings of Darwin and Herbert Spencer and became one of the strongest advocates of the doctrine of evolution. One of his earliest works, *Outlines of Cosmic Philosophy*, was based on this doctrine. For more than thirty years he expounded these theories through his lectures and writings

Fitch

and is considered to have contributed more than any other American writer towards making the ideas of these great thinkers understood by the people.

Fiske ranks among the foremost historians of his time, and by his exhaustive study he contributed much of value to American history. His style is exceptionally clear and attractive, and his writings are sympathetic. In some respects, however, his work is not authoritative, on account of his patriotic prejudices. His best-known historical works are *The War for Independence*, *The American Revolution*, *The Critical Period of American History*, *The Beginnings of New England*, *The Discovery of America* and *A United States History for Schools*. He also wrote *Old Virginia and Her Neighbors*, *Dutch and Quaker Colonies in America*, *Civil Government of the United States*, *New France and New England*, *American Political Ideas Viewed from the Standpoint of Universal History*, *Darwinism and Other Essays and Myths and Myth Makers*, besides other essays.

Fiske, MINNIE MADDERN (1865-), an American actress, born in New Orleans. Her parents were connected with the theater and she was on the stage from her early childhood. She achieved a real success when she was but thirteen years old. Three years later she appeared as a star, but although she won some success she gave little evidence of her real talent. After her marriage to Harrison Gray Fiske in 1890, she retired from the stage for three years, and on her return to it was at once successful. She played in her husband's *Hester Crewe*, Ibsen's *A Doll's House*, and in 1897 in *Tess of the D'Urbervilles*, which created a great sensation. Among her plays since that time have been *Little Italy*, *Frou-Frou*, *Magda*, *Becky Sharp*, *The Unwelcome Mrs. Hatch* and *Leah Kleschna*. Becky Sharp is considered her greatest rôle.

Fisk University, an institution for the higher education of colored people, situated at Nashville, Tenn. The university was founded by the American Missionary Society and Western Freedmen's Aid Association in 1865. It has five buildings, a gymnasium and athletic ground. It has an income of \$50,000, 500 students, 32 instructors and 10,000 books.

Fitch, CLYDE (WILLIAM) (1865-1909), an American playwright, born in New York and educated at Amherst College. His first play was *Beau Brummel*, which was produced by

Richard Mansfield in New York City in 1890 with great success. Besides a large number of original dramas, chiefly of modern society, he adapted many plays from the French and German. Of his original plays, *Nathan Hale*, *The Climbers*, *Barbara Frietchie*, *Captain Jinks of the Horse Marines*, *Her Own Way*, *The Woman in the Case*, *Her Great Match*, and *The City* proved popular. Of his adaptations, the best known are *Sapho*, *The Masked Ball* and *Cousin Billy*.

Fitch, JOHN (1743-1798), an American inventor, born in East Windsor, Conn. At the outbreak of the Revolutionary War he became a gunsmith in the American army and after this was employed in several surveying and trading expeditions in the West. He later came to Pennsylvania, where in 1785 he completed his first model of a steamboat. His second boat made a successful trial trip two years later on the Delaware. In the summer of 1790 a boat built by him made regular passenger trips between Philadelphia and Burlington, with a speed of eight miles an hour. In spite of the success of his invention, Fitch was unable to get funds to carry out his plans, and he went to France, where he was to construct boats for the government, but he was unsuccessful in getting the appointment and returned to the United States. In 1817 a committee of the New York legislature decided that he was inventor of the steamboat. See SHIP.

Fitch'burg, MASS., one of the county-seats of Worcester co., 50 mi. n. w. of Boston, on a branch of the Nashua River and on the Boston & Maine, the New York, New Haven & Hartford and other railroads. There are granite quarries in the vicinity, and the manufactures include cotton and woolen goods, firearms, engines, electrical appliances, machinery and tools. The Fitchburg State Normal School is located here. Population in 1910, 37,826.

Fitzgerald, fits jer'ald, EDWARD (1809-1883), an English poet, best known as the translator of the *Rubaiyat* of Omar Khayyam from the Persian. He was of Irish ancestry and was born in Suffolk, where he spent his life in quiet seclusion. He was educated at Trinity College, Cambridge, and early devoted himself to literary pursuits and the companionship of close friends. His extreme modesty prevented him from publishing many admirable works and doubtless deterred him from writing, except under the greatest inspiration. The first of his translations, for which he is particularly famous,

was published in 1853. The *Rubaiyat* appeared in 1859 and was practically his last great effort. It is a very free translation, but reproduces the spirit of the poem with remarkable faithfulness, while the beauty and perfection of the English lines are now generally acknowledged.

Fiume, fyoo'me, a seaport town of Austria-Hungary, a free town of the Hungarian kingdom, picturesquely situated on the Gulf of Quarnero, in the northeast extremity of the Adriatic Sea. Among the interesting buildings are an ancient cathedral, a townhall, a naval academy and a theater. There are three large harbors, and the city is the seat of all the commerce of Hungary. The town has distilleries, manufactures of soap, tobacco and paper, and important fisheries. Population in 1910, 49,806.

Five Civilized Tribes, the name commonly used by the government to designate five tribes of indians which formerly lived in tribal condition in the Indian Territory. They were for a long time practically independent republics, under the care of the United States, but in 1898 a law was passed establishing a commission to allot the lands of their reservations to individual indians. To settle and divide an estate of 20,000,000 acres of land among 75,000 heirs was a tremendous task. The work of the commission, however, proceeded rapidly, and in 1901 the final roll of the citizens in the Seminole nation was approved. The Creek roll was practically complete at the same time, and a very considerable allotment of lands had been made to the Seminole. Each citizen in the Seminole nation received \$308.76, and the lands were distributed so their value should be as nearly as possible this amount. By March, 1906, the work was completed, the Five Civilized Tribes disappeared, and their members became like other ordinary citizens of the United States. See CHEROKEE; CHICKASAW; CHOCTAW; CREEKS; SEMINOLE.

Five Forks, BATTLE OF, a battle of the Civil War in America, fought April 1, 1865, about 11 miles southwest of Petersburg, in Dinwiddie County, Virginia. A Federal force of about 25,000 under General Sheridan opposed a somewhat smaller Confederate force under General Pickett. It was the result of efforts on the part of both Grant and Lee to secure control of the village of Five Forks, which commanded the only railroad communication between the South and Petersburg and Richmond. Lee stationed a small force at Five Forks and resisted a strong attack by Sheridan on March 31, but on the following day the Federals, after receiving

reënforcements, defeated the Confederates, who lost about 5000 men. The Federal loss was about 1000. The result of this battle compelled Lee to evacuate Petersburg and practically led to his surrender.

Five Nations, THE, a name given to a confederacy of the Iroquoian tribes, living along the Saint Lawrence and in New York and Pennsylvania. Originally the Huron were members of the league, but they were expelled early in the seventeenth century. Later the Tuscarora were added to the confederacy, and in consequence they were sometimes known by the English as the Six Nations. Their organization, according to their traditions, had been established by Hiawatha, and his work was so thoroughly done that even to-day, notwithstanding all the changes that have been brought about by the white man, the confederacy still exists among the survivors. See CAYUGA; HURON; MOHAWK; ONEIDA; ONONDAGA; SENECA; TUSCARORA; IROQUOIAN INDIANS.

Fives, a kind of game with a ball, originally called hand tennis, played on a level piece of ground, with a smooth wall, against which the ball is struck after its first rebound from the ground. See HANDBALL.

Fixed Stars, those stars which appear to remain always at the same distance from one another and in the same relative position. The name comprehends, therefore, all the heavenly bodies, with the exception of the planets, their moons and the comets. See STARS.

Fjord, *fyord*. See FIORD.

Flag, a piece of cloth on which certain figures or devices are painted, impressed or wrought, borne on a staff, or pole, and usually employed to distinguish one company, party or nationality from another. In the army, a flag is the banner by which one regiment is distinguished from another. Flags borne on the masts of vessels not only designate the country to which they belong, but also are made to denote the rank of the officer commanding the ship. In the United States navy blue flags, with four, three and two white stars, are borne at the main, fore and mizzen, by the ships of admirals, vice admirals and rear admirals, respectively. The commodore's flag, abolished in 1905, was a broad blue pennant with one white star, borne at the main when the commodore was acting commander in chief. Any officer commanding a vessel, except one on board of which a flag or broad pennant may be borne, flies a narrow pennant at the main. When powder is taken on board, a red flag is

hoisted at the fore. The president's flag is blue and bears the United States coat of arms; the secretary of the navy shows a flag of blue, bearing an anchor in the center of a group of four white stars. A yellow flag is the quarantine flag. Flags of truce are white, and on water they are met by a boat or vessel from the senior officer's vessel, in charge of a commissioned officer, having a white flag. A flag reversed is a sign of distress. To lower, or *strike*, the flag is to pull it down or take it in, out of respect or submission to superiors. To strike a flag in an engagement is a sign of yielding. A sign of mourning is to hoist the flags only part of the height of the masts; if on land, half the height of the staff. Flags are the recognized means of signaling at sea, where, by international codes, ships may communicate on every necessary subject. Each nation, too, has its own private code. *Dipping* the flag is hauling it down a few feet and then running it up again. Salutes are made by dipping. In the United States navy, when the flag is hoisted at 'colors,' or hauled down at sunset, the officers and men are required to salute. See colorplate *National Flags*, also FLAG, UNITED STATES.

Flag, UNITED STATES. The birthday of the United States flag was on June 14, 1777, when the Congress "*Resolved*, That the flag of the Thirteen United States shall be thirteen stripes, alternate white and red, and that the union be thirteen white stars on a blue field." At this time there was no suggestion as to how the stars should be arranged or how many points each should have. Paul Jones displayed an ensign on the *Serapis* (1779) at Texel, in which the stars had eight points, and the stripes were blue, red and white. The first flag is said to have been made by Mrs. Elizabeth Ross, flagmaker, at 239 Arch St., Philadelphia. The French navy first saluted the American flag February 14, 1778. The first recorded naval engagement under the flag was between the *Ranger* and the *Drake* (English), April 24, 1778. At Fort Stanwix (now Rome), N. Y., upon the enemy appearing unannounced on Aug. 3, 1778, a mosaic flag was hastily constructed out of strips of sheets and bits of scarlet cloth sewed together, while out of Capt. Abraham Swartout's camelot cloak was constructed the field for the stars. The stars and stripes were associated with all the glory of the last days of the Revolution and waved in prophetic splendor over Yorktown. The first time colors were unfurled over a foreign country was when Capt. John Rathburne took possession of



UNITED STATES FLAGS

1, National Ensign.
2, President's Standard.
3, Union Flag and Jack.
4, Secretary of War.
5, Lighthouse Service.

6, United States Mail.
7, Yacht Ensign.
8, Naval Dispatch.
9, Ensign of the Revenue Marine.
10, Former Commodore's Broad Pennant, senior in rank.

11, Powder Flag.
12, Commodore's Broad Pennant, second in rank.
13, Navy Pennant.

14, Revenue Pennant.
15, Secretary of the Navy.
16, Admiral's Flag.
17, Rear Admiral, senior in rank.
18, Rear Admiral, second in rank.



FLAGS OF THE NATIONS

1, Germany.
2, Belgium.
3, Russia.
4, Austria-Hungary.

5, France.
6, Italy.
7, Norway.
8, Netherlands.

9, United States.
10, Great Britain.
11, Canada.
12, Australia.

13, Japan.
14, China.
15, Sweden.
16, Panama.

17, Mexico.
18, Brazil.
19, Argentina.
20, Chile.

Fort Nassau, New Providence Islands. The American colors were first shown in a British port by the ship *Bedford*, of Nantucket, reporting at the customhouse, London, Feb. 6, 1783. The national emblem during the War of 1812 had fifteen stars and fifteen stripes, the number having been increased by an act of Congress on the admission of Vermont and Kentucky, 1795. Eben Appleton, Yonkers, N. Y., grandson of Colonel Amstead, has in his possession the flag whose "broad stripes and bright stars" inspired the *Star Spangled Banner*, written by Francis Scott Key. On the admission of Indiana in 1816, a committee was appointed to inquire what changes were necessary to be made in our national emblem. At the suggestion of Capt. S. C. Reid the number of stripes was reduced to the original thirteen, and the stars increased to represent the number of states. By the following enactment, April 4, 1818, the present status of our flag was fixed: "*Resolved*, That from and after the 4th of July next, the flag of the United States be thirteen *horizontal stripes*, alternate red and white; that the union have twenty stars, white in a blue field; that on the admission of every new state one star be added to the union of the flag, and that such additions shall take effect on the 4th of July next succeeding such admission."

The *revenue* flag of the United States differs somewhat from the national emblem. Outside of American waters, revenue vessels may bear the national ensign in addition to the revenue flag. The revenue flag was created by an act of Congress, March 2, 1799; it consists of sixteen perpendicular stripes. The union bears the arms of the United States in dark blue on a white field, and in 1871 thirteen blue stars were substituted. The "stars and bars" of the Confederacy was adopted in 1861. One or two changes were made in this flag, and at the close of the war the stripes ran perpendicularly instead of horizontally. The stripes were three, red and white, and the stars nine. See FLAG.

Flagellants, *flaj'el lants*, the name of a sect in the thirteenth century, who maintained that flagellation was of equal virtue with baptism and other sacraments. To obtain the mercy of God and to appease his wrath against the vices of the age, they walked in procession with shoulders bare and whipped themselves till the blood ran down their bodies. Rainer, a hermit of Perugia, is said to have founded the order in 1260. He soon found followers in nearly all parts of Italy, who went about in thousands

from country to country, begging alms and led by priests bearing banners and crosses. For centuries they formed a sort of intermittent order of fanatics, frequently reappearing here and there in times of extraordinary distress.

Flageolet, *flaj'o let*, a small, wind instrument of music, played by means of a mouth-piece and finger holes. The tone produced is shrill, resembling that of the piccolo, but is softer in quality, and the range is two octaves.

Flag Officer, in regular navy, a general distinguishing title for an admiral, vice admiral and rear admiral, who have the right to carry flags indicating their rank at the mast head.

Flag of the Prophet, the sacred flag of the Mohammedans. It was originally composed of the turbans of the Koreish, captured by Mohammed; but the black curtain that hung in front of the door of Ayesha, one of Mohammed's wives, was afterward substituted. It is preserved in the seraglio at Constantinople. The carefully guarded banner unfolded at the commencement of a war is not the real sacred flag, though it is commonly believed to be so.

Flag of Truce, a white flag which, when exhibited by one of two opposing armies, indicates a desire to cease hostilities temporarily for purposes of communication. It has assumed a sort of sacred character, and firing upon a flag of truce is now considered among civilized nations a just cause for severe retaliation. The flag is in the nature of a message from the highest commanding officer of one force to the corresponding officer of the other. The one to whom the message is sent can refuse to receive it, and the messenger after being warned not to proceed farther, is not considered immune from attack if he disobeys this order. It is considered a violation of international law, also, to use the flag of truce for any other purpose than direct and immediate communication, and any attempt to secure private information by means of it is punishable by the severest measures.

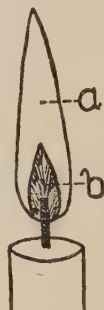
Flamboyant, a style of Gothic architecture common in France from the fourteenth to the sixteenth century, at about the same period as the Perpendicular style in England. It was distinguished by the waving and somewhat flame-like tracery of the windows, doorways and panels. The pillars are often



FLAMBOYANT TRACERY

cylindrical, either plain or with a few of the more prominent moldings of the arches continued down them, without any capital or impost intervening. The arches are usually two-centered, sometimes semicircular, and in later examples elliptical. See TRACERY.

Flame, a blaze rising from a burning body, or any inflammable gas in a state of visible combustion. Flame is attended with great heat and sometimes with the evolution of much light, but the temperature may be intense with little light, as in the case of the flame of burning hydrogen. The luminosity of flame depends upon the presence of extremely small particles of solid matter (usually carbon) or of dense gaseous products of combustion. The flame of a candle consists of a dark colored cone containing gases that look dark because they are not burning, a white envelope surrounding the cone and consisting of particles in a high state of combustion, and a second and outermost cone of yellow color, in which particles of matter are heated to the point of burning. When the pressure of the gas producing the flame is so great that it is all but flaring, it is found that certain sounds will cause the flame to alter its shape, thus producing *sensitive flames*.



FLAME
a, brilliant white envelope; b, dark inner cone.

Fla'men, among the ancient Romans, the name given to any priest devoted to the service of one particular deity. Originally there were three priests so called: *Flamen Dialis*, consecrated to Jupiter; *Flamen Martialis*, sacred to Mars, and *Flamen Quirinalis*, who superintended the rites of Quirinus, or Romulus. The number was ultimately increased to fifteen, the original three, however, retaining priority in point of rank, being styled *Majores*, and elected from among the patricians, while the other twelve, called *Minores*, were elected from the plebeians.

Flamin'go, a strange looking bird, whose body is rather smaller than that of the stork, but which, owing to its great length of neck and leg, stands from five to six feet in height. There are several different species found in Mediterranean and tropical countries, all more or less red in color, but varying in size. They migrate in V-shaped flocks. Their necks are extremely long, slender and flexible and their big, naked bills are bent abruptly down, as if broken near the middle. In feeding, the bird stands nearly

erect, thrusting its neck downward and burying its bill and perhaps its head in the water, with the top of the bill downward. It then sways its head from side to side, causing currents of water to pass back and forth through the bill, where fine horny projections strain out the seeds and the small animals that are stirred up from the bottom by the bird's feet. The birds nest in the warm countries in large colonies, upon muddy flats near the water level. Their nests are big cones, cut off squarely at such a height that the mother bird can sit with her legs dangling down the sides, though she usually sits with them folded up beneath her. The flamingo of North America nests in the latitude of Florida. The male has a light red plumage, whose large feathers have black quills; the females are pale pink and the young nearly white. As is the case with other beautiful birds, their handsome plumes are causing so many of the birds to be killed by hunters that before long only a few will remain.

Flamin'ian Way, the principal northern road which led from ancient Rome. It was constructed by Caius Flaminius the elder, in 220 B. C., during his censorship, and led from Rome



FLAMINGO

to Ariminum on the Adriatic, 222 miles. Remains of it are yet extant in various places.

Flammarion, fla'mah're ohN', CAMILLE (1842-), a French astronomer and author, most of whose writings have been popular scientific works. He studied theology for a time, but at sixteen entered the imperial observatory,



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FLAX

1—Field of flax in blossom. 2—Harvesting the flax for seed. 3—Pulling the flax for fiber. 4—Retting flax in a river. 5—Scene in a Belgian scutching mill. 6—Hackling the fiber. 7—A stalk in blossom; another in seed. 8—Flax Products.

where he remained for four years. As editor of a popular scientific magazine, *Cosmos*, his work first became prominent. Among his books are several astronomical romances and essays. Those of his publications which have been translated into English are *Marvels of the Heavens*, *The Atmosphere*, *Urania*, *Popular Astronomy*, *Lumen* and *The Unknown and Psychic Problems*. Flammarion conducted a series of balloon ascensions for the purpose of studying atmospheric phenomena.

Flanders, a region of Europe composed of the present provinces of East and West Flanders in Belgium, the southern part of Zealand and two departments of France. The erection of the territory into a county took place in the ninth century and was made by Philip the Bold, king of France, in favor of his son-in-law, Baldwin. It afterward passed to the united houses of Spain and Austria and ultimately to the latter, but was made smaller by the conquests of the French in the west, when part of it became French Flanders, and by the conquests of the Dutch in the north. The remainder still retains its ancient name and forms the modern provinces of East and West Flanders, in Belgium.

EAST FLANDERS has an area of 1158 square miles. Its soil, partly of a sandy and partly of a clayey nature, is so industriously and skillfully cultivated that it has the appearance of a vast garden. The principal crops are wheat and flax. Linen, laces and damask are among the important manufactures. Ghent is the capital. Population in 1910, 1,120,335.

WEST FLANDERS has an area of 1249 square miles. The most important industry is the manufacture of linens and laces. Bruges is the capital. Population in 1910, 874,135.

Flan'nel, a fabric made of wool, or of worsted, wool and silk, or of wool with cotton. It is used for outer and under garments, both in cold and hot climates, because it promotes an insensible perspiration, which is absorbed by the atmosphere. The best flannels are made in Wales.

Flat'fish, a fish which has a flat body, with both eyes on one side of its head, and swims on its side; for example, the flounder, turbot, halibut and sole. The term is also applied to other fishes with flat bodies, as the skate and other members of the ray family.

Flat'head, indian tribes on the Pacific coast. They flatten the skull of the infant by pressure. The same custom anciently prevailed among many tribes, but the practice is now nearly extinct. The name Flathead is improperly

given to the small, civilized tribe of Selish indians, who do not flatten the heads of their children.

Flax, a plant cultivated for its fiber and seed, both of which are of great economic value. The stalk grows from one and one-half to two feet in height, and contains considerable woody fiber and a pith. When the plants are not crowded, the stalk branches freely and bears a large number of bright blue blossoms, but when close together the stalks are long and slender, with only a few branches near the top. The flax has been known and cultivated for centuries, and from its fiber were made the costly fabrics used by the kings, queens and nobles of the oldest civilized nations. The processes in the manufacture of linen from flax fiber must always have been approximately what they are today, though of course far more crudely carried on.

The cultivation of flax demands more labor than that of almost any other crop, for every step from planting to the final preparation of the fiber must have the greatest care. If only the seed is to be used, the plants may be allowed to ripen, and may then be cut with a mower (see Figure 2 of the color plate); but if the fiber is to be saved the flax must be pulled by hand before it is quite ripe, for the best of the fiber is near the roots and is harmed by the cutting process (see Figure 3 of the color plate). The pulled flax is either tied together in bundles, and left upright on the field until it is dry, when the seeds are separated from it, or the separation is made immediately after the pulling, by means of an iron comb known as a *ripper*.

Next the flax is *retted*, or *rotted*, in water (Figure 4, color plate) until the fiber may be easily removed from the woody part of the stalk, and is then spread on the grass to dry. Each process, the retting and the drying, takes from ten days to two weeks. Freeing the fiber from the core requires two operations. First the *breaking* is done by means of a wooden handle and grooved board, or by revolving grooved rollers, and then the woody part is entirely separated from the fiber by a broad, flat wooden blade, called a *scutching blade*, or by a scutching machine (Figure 5, color plate) in which a number of knives attached to the arms of a vertical wheel strike the flax in the direction of its length. The flax is next *heckled*, or combed with an iron comb, the finer fibers being produced by repeated heckling, each time with a finer comb. See LINEN; SPINNING; WEAVING.

The finest flax fibers are used for linens and laces, the coarser for cords and ropes and such heavy fabrics as are used for sails and bags. The seed is also a most valuable crop, and in certain countries, notably the United States, flax is raised entirely for the seed, which is used in the manufacture of linseed oil. The yearly flaxseed crop of the United States amounts to about 20,000,000 bushels, practically all of which is obtained from Minnesota and the Dakotas. Russia is the world's leading producer of flax, whether for fiber or for seed, though the fiber produced in Belgium is the best in the world.

Flea, *flee*, a wingless insect, usually classed with the fly, although regarded by many entomologists as a distinct order. The common flea is a little insect about one-eighth of an inch long, somewhat flattened in shape and covered with a shell composed of hard, overlapping plates. It has two thread-like antennae, and its mouth parts are adapted to piercing and sucking. The flea is remarkable for its great agility, being able to make remarkably long leaps. Different species prey upon different animals, and some show considerable intelligence and have been taught to do many remarkable things.



FLEA

Fleabane, *flee'bane*, a name popularly given to several plants, from their supposed power of destroying or driving away fleas. The *common fleabane*, whose smoke was supposed to expel fleas, is found in moist, sandy places in the south of England. The *blue fleabane* is common on dry banks. In the United States it is found abundantly in all parts east of the Mississippi River. It is also called *sweet scabious*, and other species closely allied to it are the *horseweed* and *butterweed*, or *colt's tail*. The seed is distributed by the winds and springs up in waste places and grain fields. The easiest way to eradicate this plant is to cultivate it late and to prevent its seeding.

Fletcher, JOHN. See BEAUMONT AND FLETCHER.

Fleur-de-lis, *flor de lee'*, the French name for flower-of-the-lily, a genus of herbs of the iris family, growing in southern Europe. These flowers have large sword-shaped leaves and three-petaled flowers of various colors. The flower is famous as the emblem of the French kings. Many legends are related as to the origin of this emblem. It is generally con-

ceded that the Frankish kings employed the fleur-de-lis as a kind of badge before the rise of heraldry.

Fleury, *flō re'*, ANDRÉ HERCULE DE (1653-1743), a French cardinal and prime minister of Louis XV. Louis XIV gave him the bishopric of Fréjus and appointed him instructor to Louis XV. After the death of the regent in 1723, Fleury proposed the duke of Bourbon as first minister, but in 1726 he overturned the government which he had himself set up, and from that date he kept the direction of affairs in his own hands. In the same year he was made a cardinal. His internal policy was wise and able and greatly benefited the country.

Flicker, a common name for the *golden-winged woodpecker*, one of the handsomest and commonest birds of the eastern United States. Its prevailing color is olive-brown, with black markings, while the rump and upper tail coverts, which it shows conspicuously in flight, are pure white. It has an ash-colored head and neck, the former barred by a strip of bright scarlet. The under parts are brown, fading toward the rear into yellow, and are marked with numerous round black spots. Across the breast and throat is a broad black crescent. In addition to all this, the under parts of the tail and wings are a rich golden yellow. It is seen throughout the whole Eastern United States, wintering as far north as southern Illinois. Its notes are difficult to describe, but are loud and so characteristic that having been once heard, they are easily recognized. Few birds have ever been given so many names, owing probably to its own prominence, for it does not seem at all afraid of man and goes readily about houses and buildings. Almost every locality has its own favorite name. *High-holder*, *sap-sucker*, *yellow-hammer*, *flicker* and *golden-winged woodpecker* are but a few of the names commonly known. In the Rocky Mountains and on the Pacific coast are different species varying somewhat in color and markings.

Flint, a variety of quartz, of a yellowish or bluish-gray or grayish-black color. It does not crystallize and usually occurs in nodules, or rounded lumps. Its surface is generally uneven and covered with a whitish rind or crust, the result of weathering or of the action of water percolating through the rocks. Flint is very hard, strikes fire with steel and is an ingredient in glass and in all fine pottery. Its true native place is the upper bed of the chalk formation.

Flint, MICH., the county-seat of Genesee co., 68 mi. n. w. of Detroit, on the Flint River and on the Grand Trunk and the Pere Marquette railroads. The city has extensive lumber mills, grain elevators, breweries, brickyards, woolen mills and manufactories of flour, wagons, cigars, and other articles. It has a public library, Oak Grove Hospital and a state institution for the deaf and dumb. Flint was settled in 1820 and was chartered as a city in 1855. Population in 1910, 38,550.

Flint'lock, the name given to a gun which probably originated in Spain and was in use in one form or another from the early part of the seventeenth century to the early part of the nineteenth century. A piece of flint was fastened in the hammer, which, falling, struck a piece of steel. The sparks thus produced fell into a priming pan filled with powder, and thus exploded the charge.

Flod'den Field, a plain in Northumberland, famous for the battle fought there September 9, 1513, between James IV of Scotland and an English army led by the earl of Surrey. The armies were approximately equal in strength, and for a time the outcome of the battle was uncertain. The Scotch were, however, finally forced to retreat, with a loss of from eight thousand to ten thousand men. The English lost four thousand. Sir Walter Scott, in *Marmion*, gives a description of the battle.

Flood, a body of moving water which overflows land not usually covered with water. Flat lands on the sea coast and along the shores of rivers are, naturally, most exposed to danger of this sort, and history from the earliest times presents a long list of disasters from flood.

SEA FLOODS. These are far less frequent than river floods, but are likely to cause far more damage when they do occur. The most common cause of inundations by the sea is the bursting of dykes or sea walls in those countries which are actually below sea level at time of high tide. Parts of the Netherlands, for instance, are from sixteen to twenty feet below sea level, and only great dykes along much of the coast make the country a land area instead of a water area. In past times, when the construction of dykes was not as well understood as it is today, there were periodic floods which were terribly destructive. In 1421, about 100,000 people were drowned and 72 villages were under water. Just a century later another disastrous flood killed almost 100,000, and in 1570 about 20,000 perished in Friesland. Other

causes of sea inundations are unusually high tides, or severe winds which drive the waves inland. The disaster at Galveston on September 8, 1900, in which 6,000 lives were lost and 3,000 buildings destroyed, was the result of a hurricane which piled up the waters on the coast. Earthquakes, too, occasionally give rise to sea floods, the best known example of such a disturbance being the tremendous tidal wave which followed the earthquake by which Lisbon was destroyed in 1755.

RIVER FLOODS. The United States has always suffered much from the overflow of rivers; indeed, one authority estimates that for years the annual devastation from floods of the Ohio alone has averaged \$50,000,000. River floods result from excessive rains, the sudden melting of ice and snow, or the bursting of reservoirs or banks. If such floods are regular, they may be quite the reverse of destructive; in Egypt, for instance, the agricultural life of the people has always depended on the overflow of the Nile (which see). The Mississippi River, too, is subject to floods, and almost a score of destructive inundations are recorded between 1828 and 1912. From Cairo to the mouth of the river levees have been built to hold the water within bounds, but an unusual rise in volume may either overtop these embankments or make breaks in them. The flood of March and April, 1912, was the most serious of which there is record. Over 15,000 square miles were flooded, many lives were lost, and property valued at \$45,000,000 was destroyed.

A year later, in the latter part of March, 1913, there occurred over much of Indiana and Ohio the heaviest rainfall ever recorded there, and as a result all the streams of that region passed their flood stages, and various towns were inundated. In Dayton, O., over 150 people lost their lives and millions of dollars worth of property was destroyed. Columbus, Zanesville, Chillicothe, Delaware, Hamilton, Piqua and Tiffin, in Ohio, and Peru and Brookville, Indiana, also suffered severely. These spring floods of 1913 surpass in point of property loss any other natural disaster in the history of the country.

As a means of preventing floods, various methods and devices are advocated, chief of which are the construction of reservoirs at stream sources, the extending and strengthening of levees and jetties, and the planting of trees on treeless areas. See *LEEVEE*; *JETTY*; *FORESTS*, subhead *Value of Forests*; *MISSISSIPPI RIVER*.

Flood Plain, a plain formed by a river depositing sediment at its mouth or along its course. If formed in the upper or middle part of the river's course, the flood plain may be composed almost entirely of gravel and coarse sand, but the most extensive plains of this sort are formed in the lower part of the river's course and are composed of fine silt or alluvium. The flood plains in the lower course of the river or near its mouth are usually wider than those farther up stream. Since they follow the course of the stream, many of these plains are very irregular. In case of high water they may be flooded and covered with a new deposit of silt, or the current of the stream may become sufficiently strong to cut a new channel and cause serious damage. The flood plains along great rivers are usually densely populated, because of their fertility. The most noted of these plains are along the Nile, the Po, the Mississippi, the Rhine and the Ganges. See DELTA; RIVER.

Flo'ra, the Roman goddess of flowers and spring, whose worship was established at Rome in the earliest times. Her festival, the Floralia, was celebrated from April 28 to May 1.

The term *flora* as a common noun is used in botany to designate the total plant life of any region or period, as the flora of Massachusetts or the flora of the Carboniferous Age. The corresponding word for animal life is *fauna*.

Florence, *flor'ens*, a celebrated city of Italy, capital of a province of the same name, 143 mi. n. w. of Rome, and 50 mi. e. n. e. of Leghorn, on the river Arno. This stream is crossed by six bridges, the most important being the Ponte della Santa Trinita and the Ponte Vecchio. Most of the private dwellings are handsome, and the palaces, of which there are many, are noble and impressive structures. The city contains numerous piazzas or squares, the most important of which is the Piazza della Signoria. The most remarkable building in Florence is the Duomo, or Cathedral of Santa Maria del Fiore, which has the largest dome in the world. It has a magnificent campanile, which was begun by Giotto in 1334. The Church of Santa Croce, which is the burial place of many of the most eminent Tuscans, contains much fine sculpture and many interesting tombs, among others those of Michelangelo, Galileo, Machiavelli and Alfieri. The charitable institutions are numerous and important. Schools and other literary and educational establishments are also numerous. The manufactures have greatly declined in importance, but still embrace woolens, silk,

straw hats, porcelain, mosaics and numerous objects in the fine arts.

Florence was probably founded by the Romans in the first century B. C. and early attained considerable prosperity. In 1215 the city became the center of a bitter strife between the two factions known as Guelphs and Ghibellines (See GUELPHS AND GHIPELLINES). In 1283 a species of republic was constituted; but about the year 1300 party struggles again burst forth between rival families under the new names of the *Whites* and the *Blacks*, in which the Blacks were eventually victorious, and the Whites, among whom was the poet Dante, were banished. Towards the close of the fourteenth century, the wealthy Abizzi became chief rulers of Florence, but they were overthrown in 1434 by the Medici, who then ruled supreme. Under their rule the city rose to great splendor (See MEDICI). The ducal dynasty of Medici continued to rule till the year 1737, when, becoming extinct, they were succeeded by Francis of Lorraine, afterward emperor of Germany. From this period the history of Florence merges into that of Tuscany, until its amalgamation with the kingdom of Italy. From 1865 till 1871 it held the dignity of capital of the kingdom, the seat of government being transferred to it from Turin. Among the illustrious men it has produced are Dante, Petrarch, Boccaccio, Guicciardini, Lorenzo de' Medici, Galileo, Michelangelo, Leonardo da Vinci, Benvenuto Cellini, Andrea del Sarto, Amerigo Vespucci, Machiavelli and others. Population in 1911, 232,860.

Florence, ALA., the county-seat of Lauderdale co., 127 mi. s. w. of Nashville, Tenn., on the Tennessee River and on the Louisville & Nashville and the Southern railroads. The manufactures include wagons, wooden pumps, boilers, engines, stoves, fertilizers, cottonseed oil, pig iron, cotton yarns and cloth. There are extensive lumbering and mining industries in the vicinity. Florence ships most of the cotton of the adjacent country. It is the seat of the state normal college. A steel railroad and passenger bridge here crosses the Tennessee. Population in 1910, 6689.

Florence, S. C., the county-seat of Florence co., is situated 82 mi. e. by n. of Columbia, on the Atlantic Coast Line Railroad. It is in the midst of a fertile agricultural region and has a large trade in tobacco and cotton. The important industrial establishments include tobacco warehouses, stemmeries and drying houses, cottonseed oil mills, lumber mills, railroad shops and

machine shops. The city has a fine United States Government building and owns and operates its waterworks. Population in 1910, 7057.

Florentine School of Painting. See PAINTING.

Flor'ida, the EVERGLADE STATE (also called the PENINSULA STATE), one of the Southern states, forming the southeastern extremity of the country, bounded on the n. by Alabama and Georgia; on the e. by the Atlantic Ocean; on the s. and w. by the Gulf of Mexico, and on the w. by Alabama. It consists of a peninsula about 400 miles long and 90 miles wide, and a narrow belt 350 miles in length from west to east, extending from the Perdido River to the Atlantic coast. The total area is 58,666 square miles, of which 3805 are water surface. Population in 1910, 752,615.

SURFACE AND DRAINAGE. The northwestern part of the state is hilly and rolling, being an extension of the Alabama uplands. This region descends to a low flat coast. The eastern part of the state is low and nearly level, but the surface rises from each coast towards the interior, where in some places it reaches an altitude of from 100 to 300 feet. This rise forms the divide which separates the rivers flowing into the Atlantic from those flowing into the Gulf. The lands along the coast are low, level and often marshy. They have been formed by gradual elevation from the ocean and by the action of the coral polyp (See CORAL). The coral formation is still going on, as seen along the coast and in the growth of the Florida Keys, which appear to be an extension of the mainland. These islands extend southwest along the coast for 200 miles; they rise but a few feet above the water, but contain fertile farms, and in others are found good harbors. South of Lake Okeechobee the Big Cypress Swamp and the everglades extend over a large part of the peninsula. These swamps will eventually be drained and transformed into fertile farms (See EVERGLADES). Florida has a coast line of nearly 1200 miles in extent. Of this 675 miles are on the Gulf and the remainder on the Atlantic. The western coast contains several deep indentations in which good harbors are found, but the eastern is much more regular.

The principal rivers are the Saint Mary's, forming a part of the boundary between Florida and Georgia; the Saint John's, flowing into the Atlantic; the Caloosahatchee, draining Lake Okeechobee into the Gulf; the Peace, flowing into Charlotte Harbor; the Suwanee, crossing the state from the north, and the Appalachian, which is an extension of the Chattahoochee and

Flint rivers of Georgia. The state contains over 1200 lakes, the largest of which is Okeechobee, which has an area of 650 square miles. This is situated on the northern border of the Everglades (See EVERGLADES).

CLIMATE. Florida, except in the swamp region, possesses one of the most equable and healthful climates in the United States. The climate is free from extremes, the winter temperature seldom falling below 32° and the summer temperature rarely exceeding 90°. The average annual winter temperature is 60°, the average summer temperature, 78°. There is little spring or autumn and such a brief winter that summer is said to last two-thirds of the year. June, July and August constitute the rainy season. There are, on an average, 250 clear days in the year. Droughts and frosts are rare. Jacksonville, Saint Augustine, Miami, Key West and Tampa are popular winter resorts, especially for persons afflicted with throat or lung diseases. The rainfall is heavy, being 55 inches at Jacksonville and over 60 inches in some places on the gulf coast.

MINERAL RESOURCES. The minerals are comparatively few. The most important mineral is phosphate rock, which is found in almost every county of the state and in some sections is mined in large quantities and exported to European countries for fertilizer. Kaolin, peat, lime and limestone are found in limited quantities, and in a few localities, agate, carnelian and chalcedony are found of sufficient quality to make them valuable as precious stones. Fuller's earth is an important product.

AGRICULTURE. Agriculture is the leading industry of Florida. For agricultural purposes the state may be considered in three divisions, Northern, Middle and Southern Florida. Northern Florida includes that part of the state extending south as far as Saint Augustine. It produces cereals, arrowroot, rice, potatoes, tobacco, apples, figs, peaches, pears and sea-island cotton. Middle Florida extends from the latitude of Saint Augustine to Tampa Bay. This region yields cotton, sugar cane, sweet potatoes, tobacco, rice, oranges, lemons, grapes, guavas, garden vegetables and small fruits. In Southern Florida are produced bananas, sugar cane, pineapples, olives and cocoanuts. Fruits from China and Japan have been successfully introduced. The ginger, clove, pepper and pimento are valuable products. The cultivation and export of oranges is an important industry. Cotton, rice, sugar and tobacco are also valuable products. Stock-

raising is an important branch of agriculture. Grasses grow in abundance, and flowers bloom in luxuriance almost all the year round. The most valuable resource of Florida is its forests, estimated to cover 25,000,000 acres and composed largely of pitch pine and different species of evergreen oaks.

OTHER INDUSTRIES. The principal manufactures are lumber and forest products, tar, turpentine and resin. Large areas are covered with groves of long-leaved pine, and the lumber from this is exported to other states and to foreign countries. Pensacola and Jacksonville are the chief cities of lumber export. Exceeding lumber in importance is the manufacture of cigars, which industry has its chief center at Tampa. This industry is of comparatively recent growth and was introduced into the state by immigrants from Cuba. The manufacturer uses the tobacco raised in Florida and some transported from Cuba.

The coasts and streams contain an abundance of food fish and shellfish, and the taking of shad, mullet and other fish is an important industry. Oyster culture has also been established in some localities, and there are extensive sponge fisheries in and about the islands. In all, the fisheries furnish employment to over 9000 men, and the value of their annual product is \$3,400,000.

TRANSPORTATION AND COMMERCE. The extensive coast line affords good harbors, especially on the gulf coast. The Saint John's, Saint Mary's, Suwanee and Appalachicola rivers are all navigable for large boats, and a number of other streams are navigable for smaller ones. The railways have been rapidly extended through the state in the last few years, and trunk lines now connect all of the important cities with one another and with the principal commercial centers farther north. The railway mileage of the state is about 3500 miles in extent.

The commerce consists in the export of fruits, manufactured tobacco, fish and phosphate rock, while the imports of the state are largely of manufactured products and of foodstuffs not profitably grown there.

GOVERNMENT. The legislature consists of a senate and an assembly, the former composed of 32 members, chosen for four years, and the latter of 68 members, chosen for two years. The legislative sessions are held every other year and are limited to sixty days. The governor is elected for four years and is not eligible to succeed himself. The other state officers, elected for an equal term, are the attorney-general, the

secretary of state, the comptroller, the commissioner of agriculture, the treasurer and the superintendent of public instruction. The courts consist of a supreme court, comprising a chief justice and five associates, chosen every other year by twos, for a term of six years; also circuit, criminal and county courts and those of justices of the peace. The main units of local government are the counties and incorporated municipalities. The counties elect five commissioners and a sheriff, who, with the other county officers, serve for a term of two years.

EDUCATION. The schools have the benefit of a fund derived from the sixteenth section of land in every township, also of a fund obtained from a one-mill tax assessed upon all taxable property. These funds are supplemented by local taxation. In the larger towns graded schools are established, and throughout the state there are separate schools for white and colored children. Florida, like all other states that suffered in the Civil War, has met with many difficulties in developing its educational system, but notwithstanding this, continuous progress is being made, and within the last few years a marked advance is noticeable. The higher institutions of learning are the University of Florida at Gainesville and the Florida State College for Women at Tallahassee. Numerous colleges and secondary schools are maintained by various church denominations.

The state institution for the blind and dumb is located as Saint Augustine and the state reformatory is at Marianna. There is a hospital for the insane at Chattahoochee, also a home for the Confederate soldiers and sailors. The state convicts are maintained in camps, instead of in a central penal institution, and are managed under the contract system, by which they are employed in squads under the supervision of state officers, but in the interests of private individuals or corporations, to whom the convicts are leased.

CITIES. The important cities are Tallahassee, the capital, Jacksonville, Saint Augustine, Tampa, Key West, Pensacola and Gainesville, each of which is described under its title.

HISTORY. Florida was discovered on Easter Sunday (Spanish, *Pascua Florida*, hence its name) in 1512, by Ponce de Leon, a Spanish adventurer in search of the fountain of perpetual youth. Narvaez and De Soto both traversed the country. Huguenot refugees twice attempted settlement on the Saint John's River; the second time the colonists were massacred by Spaniards under Menendez, who founded Saint Augustine.

Florida

In 1699 the Spaniards founded Pensacola. East and West Florida (separated by the Appalachicola River) came under the control of the English by the treaty of 1763; were ceded to Spain in 1783 and transferred to the United States in 1819, after a long controversy, due to the fact that Florida was a haven for pirates and thieves and a refuge for fleeing slaves, while Spain took no steps to preserve order. Florida was admitted to the Union in 1845. From 1835 to 1842 war was waged with the Seminoles, and as a result they were given lands west of the Mississippi. In 1861 the state seceded from the Union and seized Fort Marion, the arsenal at Saint Augustine, the arsenal at Chattahoochee and the navy yards and forts at Pensacola. In 1862 Jacksonville, Fernandina and Saint Augustine were captured by the Federal forces. In 1865 the ordinance of secession was repealed, and in 1868 a new constitution was framed, the Fourteenth Amendment was ratified and the state was readmitted to the Union. From this time on the chief points of interest in Florida history concerned the bitter political contests for control of the state and the settlement of financial difficulties by the government. The state played an important part in the election controversy of 1876 and has since been generally Democratic.

Florida, **GULF OF**, the narrow sea between Florida, Cuba and the Bahama Islands. The length is over 300 miles, and the width is from 60 to 100 miles.

Florida Keys or Florida Reefs, a chain of islands, sand banks and reefs, which begin at Cape Florida and continue southwest for about 220 miles. There are a great many of these islands and most of them are of coral formation. One of the largest is Key West, or Bone Key, on which is built the city of Key West. For illustration of Florida East Coast Railway, see **KEY WEST**.

Flor'in, a name given to several coins of gold or silver, of different values, and to corresponding moneys of account. The English florin is equal to 2 shillings, or about 50 cents. Until recently the florin, or *guilder*, worth about 40 cents, was the monetary unit of Austria, and a coin of the same name and value, also called *guilder*, is still the unit in the Netherlands. The name was first given to a famous coin made in Florence about 1252.

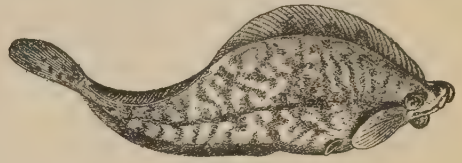
Flotow, *flo'to*, **FRIEDRICH VON** (1812-1883), a German musical composer. His musical education was brief, terminating in 1830, when he

Flour

began to devote himself to composition. His *Le Naufrage de la Meduse* was successfully produced at the Renaissance Theater in 1839. This was followed by *L'Esclave de Camoens* and *Le Forestier*. *Alessandro Stradella* was performed at Hamburg in 1844, and his greatest work, *Martha*, was given at Vienna in 1847.

Flot'sam, Jet'sam and Li'gan. In English law, *flotsam*, or *floatsam*, is shipwrecked goods floating on the sea; *jetsam*, goods thrown overboard, which sink and remain under water; and *ligan*, goods sunk with a wreck or attached to a buoy, so that they may be recovered. Such goods go to the Crown.

Floun'der, one of the most common of the flat sea fishes, found along the shores of almost all countries. The body, which is extremely flattened at the sides, has the upper side dark



FLOUNDER

and spotted and the under side white. Both eyes are on the upper side, and one is set lower than the other, giving the face a twisted appearance. The flounder is esteemed for its flesh.

Flour, *flour*, the edible part of wheat or any other grain, reduced to powder and separated from the bran and the other coarser parts by lifting. The flour of oats and corn is usually called *meal*, and that from other grains takes its name from the grain, as rye flour and barley flour, while the term *flour*, without any qualification, means *wheat flour*.

The process of manufacturing flour in modern flour mills is as follows: The wheat is run from the cars into tin carrying-cups on an elevator belt, which lift it to the top of the building and dump it into bins. When needed it is let out, by means of spouts, into the machines which prepare it for grinding. It is forced first in a slow, steady stream into the mouth of a device known as the wheat separator and oat extractor. As it falls downward a blast of air strikes it, and the chaff and light dirt are blown away. The wheat falls upon a sieve, set at an incline, and passes through the meshes. Grains of corn, oats and pieces of straw are thus separated from the wheat. After passing through three such sieves, the wheat strikes a fourth, in which the perforations are so small that only the bits of clay and

small seeds go through, and the wheat itself is carried over into a spout, which carries it along to the cockle separator. Cockle is a rough, black seed which, if ground in with the flour, makes it dark and unwholesome. The device for removing this from the wheat consists of a round cylinder, the inside of which is full of small indentations, large enough to catch and carry a cockle seed, but too small for a grain of wheat. When the wheat is inside, therefore, and the cylinder revolves, the cockle is carried up in the indentations, and falls out upon the catch board. The cylinder being set at an angle, the wheat slides out by itself.

The next machine is a cylinder, in which a wire brush revolves very rapidly. As the wheat goes through, the fuzz at the end of the kernel and every particle of dirt from the crease is wiped out and sucked away into an air shaft. From this machine the wheat passes in a steady stream over some powerful magnets, so that any bits of iron wire, nails or screws which may have fallen into the grain from the harvesters or threshers, will be drawn out.

The wheat is now clean and ready to be crushed. The grinding is done by steel or porcelain rollers, and every complete mill has five sets of these rolls. In the first the spiral corrugations on the rolls are comparatively coarse, so that the wheat will simply be broken open longitudinally. The other sets grow progressively finer and are set much closer together. From the rolls the crushed wheat goes up to be *scalped*. The machines used in most mills for this purpose are centrifugal reels, covered with wire cloth and silk gauze, the meshes of which vary in size. The crushed wheat is thrown at the sieves by centrifugal force, and many impurities are removed. One of these machines consists of a long flat box, full of sieves, set at an incline and perforated with graduated meshes. The whole device is given an eccentric motion by being fastened a few inches at one side of the center to a great wheel. By this means of jolting, the crushed wheat is rattled through the sieves and graded according to the size of mesh through which it passes.

The *middlings*, as the crushed wheat is called, is now carried on to the middlings purifier, the invention of which a few years ago revolutionized the whole art of milling. Its work is to remove the impurities and the bran from the flour. It accomplishes this purpose by subjecting the passing stream of middlings to air blasts of varying force. The light dust and bran are

carried upward and caught in little pockets, and the purified middlings pass back to the second set of rollers, where they are crushed again. This circuit of processes, the rollers, the plansifter and the middlings purifier, is repeated five different times, and the separation and grinding is then complete. The flour from the last process is carried downstairs, where it is cooled by a blast of cold air and run into sacks. The bran, after passing through a machine which brushes off the remaining particles of flour, goes through a chute of its own and is bagged.

One of the most important machines in a mill is the dust collector. Before it was invented the air of mills was always full of flying particles of flour, which sometimes exploded with all the force of gunpowder. The dust collector is a fan, which, in creating a vacuum, sucks the flour out of the air and deposits it in a chamber by itself. See **WHEAT**.

Flower, ROSWELL PETTIBONE (1835-1899), an American capitalist and politician, born in Jefferson County, N. Y. He removed to New York City in 1869 and soon attained an influential place in Wall Street. He was elected Democratic representative to Congress in 1881 and was governor of New York from 1892 to 1894.

Flowers, modified branches, or shoots, designed for the production of seeds. In a typical flower there are four circles or parts: The first, or outermost, is the *calyx*, which is often leaf-like and in the form of a cup, but divided into separate parts, known as *sepals*. The function of the calyx is the protection of the more delicate parts within. The next circle within is the *corolla*, whose parts are called *petals*. The corolla is usually bright-colored, and its design seems to be to attract insects or birds and, also, to protect still further the *stamens* and *pistils*, that form the third and fourth circles. Each of the stamens is composed of two parts, a stem, called the *filament*, and a sack at the top, called the *anther*. The innermost organs are called pistils and consist of, first, an enlarged chamber, called the *ovary*, containing *ovules*; a stem, called the *style*, and a tube, called the *stigma*. Within the stamens is ripened the *pollen*, which must be carried to the pistils, in order to fertilize the ovules, which thereafter become seeds. Few flowers are altogether typical. Often, not all of the four circles are present. Either the calyx or the corolla or both may be lacking, or only stamens may be found in one flower, while the pistils are in another flower on the same plant. The flowers on one plant may all contain stamens



NATIONAL FLOWERS

1 and 2, Roses: England and Persia.
 3, Shamrock: Ireland.
 4 and 5, Lilies: Italy.
 6, Edelweiss: Switzerland.

7, Fleur-de-lis: France.
 8, Cactus: Mexico.
 9, Chrysanthemum: Japan.
 10, Thistle: Scotland.
 11, Sugar Maple: Canada.

12, Golden-Rod: United States.
 13, Lotus: Egypt and India.
 14, Pomegranate: Spain.
 15, Kaiser-Blume: Germany.



STATE FLOWERS

- 1, Orange Blossom: Florida.
 2, Magnolia: Louisiana, Mississippi.
 3, Mountain Laurel: Connecticut.

- 4, Rhododendron: Washington, West Virginia.
 5, Anemone: South Dakota.

- 6, Violet: Illinois, New Jersey, Rhode Island, Wisconsin.
 7, Daisy: Tennessee.
 8, Carnation: Indiana, Ohio.

Flowers

only, while those of another plant contain pistils only. Then, the parts of each circle may be variously united in one solid ring or cup, or so grown together that it is impossible to distinguish one circle from the other. However numerous or remarkable these variations, it is almost always possible to distinguish some trace of the typical flower; that is, if there are five divisions in any one of the circles, traces will be found of a similar division in the other circles. The typical flowers are comparatively uninteresting if one considers the wonderfully irregular blossoms of many plants. The meaning of these strange shapes has not yet been fully determined, but botanists who have made a painstaking study of the varied forms think that all have some definite reference to the way in which the pollen is carried from stamens to pistils (See ORCHID). The one great fact in the life of the flower is that the pollen must be transported to the stamen, and it has been proved again and again that those plants grow strongest and best which are from seeds fertilized by pollen from a different flower on the same plant or from an entirely different plant. If one considers that the brilliancy of color, the varied and wonderful shapes, the honey-bearing sacks, the peculiar markings are all methods of attracting insects or birds, the astonishing irregularity becomes even more attractive than at first it seemed. In the accompanying plate are to be seen some of the most remarkable forms of flowers.

Flowers, ARTIFICIAL, imitations of flowers, which may be made of various materials. Such flowers were known centuries before the beginning of the Christian era; flowers made of papyrus bark and silk were common in Greece, and in both Greece and Rome there were in use wreaths of flowers made of gold and silver. During the Middle Ages artificial flowers were made in great numbers, especially in Spain and Italy, and were used for religious purposes. Among modern cities Paris takes the lead in the making of artificial flowers. The most common materials used in this industry are silks, linen, cotton, gauze, satin, velvet, wax, paper and glass. The stems are made of wire, wrapped with tissue paper or silk or covered with green rubber tubing.

Artificial flowers are used in the United States and England chiefly as trimming for ladies' headwear, but in Europe they are still in use for garlands and in house decorations. Another important use to which they are put is the illustration in botanical laboratories of the flora of the world.

Flowers

Of course the manufacture of flowers which are to be used for this purpose is a much more delicate task than that of flowers which are used merely for ornament, and the maker must have considerable botanical knowledge. There is at Harvard University a collection of flowers made of glass, which illustrate the flora of the United States.

Flowers, LANGUAGE OF, a device originating long ago in the Orient, by which one may partially express his thoughts and feelings by means of flowers. It grew out of the custom prevalent in medieval times, by which lovers conveyed their tender messages through beautiful flowers. To some extent the custom still survives, though in the practical New World it is of little interest. Strangely enough, the language is almost universal, varying in different countries only in regard to certain flowers which are locally significant. Still, as in the olden times, the lily denotes innocence; the forget-me-not, friendship; the red rose, I love you, and the white rose, I will wed you. The following are flowers whose significance is well established:

Amaranth.....	Immortality
Anemone.....	Anticipation
Apple Blossom.....	Admiration
Aspen Leaf.....	Fear
Brier.....	Insult
Buttercup.....	Wealth
Camellia.....	Illness
Calla.....	Pride
Candytuft.....	Indifference
Cornflower.....	Heaven
Cowslip.....	Youthful beauty
Cypress.....	Death
Daffodil.....	Unrequited love
Daisy.....	SimPLICITY
Dandelion.....	Coquetry
Evergreen.....	Hope
Everlastings.....	Undying affection
Fern.....	Forsaken
Five-leafed Clover.....	Bad luck
Four-leafed Clover.....	Good luck
Foxglove.....	Insincerity
Goldenrod.....	Encouragement
Heather.....	Loneliness
Heliotrope.....	Devotion
Hepatica.....	Anger
Honeysuckle.....	Fidelity
Hyacinth.....	Sorrow
Ivy.....	Trustfulness
Laurel.....	Fame
Lilac.....	Fastidiousness
Lotus.....	Forgetfulness
Marigold.....	Contempt
Moss or a dry twig.....	Old age
Myrtle.....	Wedded bliss
Narcissus.....	Vanity
Oak Leaf.....	Power
Orange Blossom.....	Marriage
Oxalis.....	Pangs of regret

Flowers

Palm Leaf.....	Conquest
Pansy.....	Loving thoughts
Poppy.....	A tryst at evening
Rosemary.....	Remembrance
Rue.....	Repentance
Scarlet Geranium.....	A kiss
Snowdrop.....	A friend in need
Sting Nettle.....	Rudeness
Tuberose.....	Bereavement
Tulip.....	Boldness
Violet.....	Modesty
Yellow Rose.....	Jealousy

Flowers, NATIONAL AND STATE. In some countries a flower has been legally adopted as national emblem, but in a majority of cases it has by its association with the poetry, religious ceremonies or popular sentiment of the people gradually become universally recognized as the nation's symbol. One of the oldest of national flowers is the lotus of Egypt, sacred to the god Osiris and, in all hieroglyphics, signifying Southern Egypt. The lotus is also the national flower of India, and the natives believe that in its bosom Brahma was born. For Persia the emblem is the rose; for Japan, the chrysanthemum. The national flower of modern Greece is the blue violet; of modern Italy, the white lily; of France, the *fleur-de-lis*, or iris; of Germany, the *Kaiser-blume*, or corn flower; of Switzerland, the rare edelweiss. On the national coat of arms of Great Britain, just below the shield, are engraved the English rose, the Scotch thistle and the Irish shamrock. Spain's emblem is the scarlet pomegranate; Mexico's, the prickly pear.

In the United States, in 1899, by a popular vote, the goldenrod was selected as the national flower. A number of states have adopted, usually by vote of the public school children, certain local flowers as their emblems. The following is a list of these states:

Alabama.....	Sunflower
Alaska.....	Forget-Me-Not
Arizona.....	Sequoia Cactus
Arkansas.....	Apple Blossom
California.....	Poppy
Colorado.....	Columbine
Connecticut.....	Mountain Laurel
Delaware.....	Peach Blossom
District of Columbia.....	Nasturtium
Florida.....	Orange Blossom
Georgia.....	Cherokee Rose
Idaho.....	Syringa
Illinois.....	Violet
Indiana.....	Carnation
Iowa.....	Wild Rose
Kansas.....	Sunflower
Kentucky.....	Goldenrod
Louisiana.....	Magnolia
Maine.....	Pine Cone and Tassel
Maryland.....	Black Eyed Susan
Michigan.....	Apple Blossom

Fluorescence

Minnesota.....	Moccasin
Mississippi.....	Magnolia
Missouri.....	Goldenrod
Montana.....	Bitterroot
Nebraska.....	Goldenrod
Nevada.....	Sagebrush Shrub
New Jersey.....	Violet
New Mexico.....	Cactus
New York.....	Rose
North Dakota.....	Wild Rose
Ohio.....	Carnation
Oklahoma.....	Mistletoe
Oregon.....	Oregon Grape
Rhode Island.....	Violet
South Dakota.....	Anemone
Tennessee.....	Daisy
Texas.....	Bluebonnet
Utah.....	Sego Lily
Vermont.....	Red Clover
Washington.....	Rhododendron
West Virginia.....	Rhododendron
Wisconsin.....	Violet
Wyoming.....	Gentian

FLOYD, JOHN BUCHANAN (1807–1863), an American statesman and soldier, born at Blacksburg, Va., educated at the College of South Carolina. He was admitted to the bar and practiced his profession at Helena, Ark., but returned to Virginia in 1839. He later served in the legislature and was governor of the state. In 1857 he was appointed secretary of war and constantly administered favors to the party then demanding the secession of the Southern states, until December, 1860, when he retired from the cabinet at the request of the President. He was a brigadier-general in the Confederate army and was senior in command at Fort Donelson before its surrender. See FORT HENRY AND FORT DONELSON.

Fluorescence, *flu o res'sens*. When a ray of white light passes through a prism, the solar spectrum is seen showing violet at one end. There are, however, other invisible rays in the space beyond the violet. If these rays are sent through uranium glass, or through solutions of quinine, horse-chestnut bark or some other substances, the rays become luminous, with a pale glow. This phenomenon is known as *fluorescence*. In this way, green crystals, as of fluor spar, may give out blue rays, due not to the color of the body, but to its power of modifying the rays falling upon it. The term *fluorescence* is applied to the phenomenon if it is observed while the body is actually exposed to the source of light; *phosphorescence*, to the effect of the same kind, but usually less intense, which is observed after the light from the source is cut off. Both forms of the phenomenon occur in a strongly marked degree in the same bodies. Canary glass, which is colored with oxide of uranium, is a very



STATE FLOWERS

- | | | |
|--|---------------------------------|---|
| 1, Columbine: Colorado. | 4, Pine Cone and Tassel: Maine. | 8, Sunflower: Alabama, Kansas. |
| 2, Violet: Illinois, New Jersey,
Rhode Island, Wisconsin. | 5, Mistletoe: Oklahoma. | 9, Golden-Rod: Kentucky, Missouri,
Nebraska. |
| 3, Gentian: Wyoming. | 6, Poppy: California. | |
| | 7, Bluebonnet: Texas. | |



Kate Abelmann

STATE FLOWERS

1, Apple Blossom: Arkansas, Michigan.
2, Rose: New York.
3, Peach Blossom: Delaware.

4, Black-eyed Susan: Maryland.
5, Sego Lily: Utah.
6, Red Clover: Vermont.

7, Moccasin Flower: Minnesota.
8, Wild Rose: Iowa, North Dakota.
9, Bitter Root: Montana.
10, Syringa: Idaho.

convenient material for the exhibition of fluorescence. A thick piece of it, held in the violet or ultra-violet portion of the solar spectrum, is filled to the depth of from an eighth to a quarter of an inch with a faint nebulous light. If the solar spectrum be thrown upon a screen freshly washed with sulphate of quinine, the ultra-violet portion will be visible by fluorescence; and if the spectrum be very pure, the presence of dark lines in this portion will be detected.

Fluorine, *flu'or in* or *flu'or een*, a very widely distributed element, known chiefly in combination, though since it was isolated in 1887 by Moissan, it has been known as a colorless, intensely irritating gas, which attacks almost every substance and is the most active element known. Its most abundant compound is calcic fluoride, which not only exists in the mineral kingdom, as fluor spar, but forms an essential part of the bones and teeth of animals. Fluorine has also been detected in the blood and in milk; in plants, in volcanic sublimates, in rocks and in a variety of minerals. Combined with hydrogen, it forms hydrofluoric acid, which is used extensively in etching glass.

Flu'or Spar, fluoride of calcium. It is of frequent occurrence, in connection with beds of silver, tin, lead and cobalt ores. It is sometimes colorless and transparent, but more frequently it exhibits tints of yellow, green, blue and red. Fluor spar crystallizes in cubes and the crystalline varieties form beautiful specimens. It is used as a flux in metallurgy and is a source of hydrofluoric acid, which readily etches glass.

Flute, a wind instrument resembling a fife, but having more finger holes and from six to a dozen keys, thus giving it a compass of nearly three octaves. It is a very important instrument in an orchestra, and is often used for solo parts. A piccolo is a high, shrill flute.

Fly, the common name of many insects belonging to various genera and species, and characterized in general by two transparent wings. Some flies, however, have no fully developed wings. In almost all the species, even in those which have no full-grown wings, there are present two small rod-like organs which take the place of the hind wings and probably serve as balancers in flight. Besides the flies there is only one other insect, a scale-insect, which has but two wings. The head of a fly is usually insignificant, except for the eyes, which are relatively very large and consist often of thousands of facets. There have been, up to the present time, over 40,000 species of flies described. But

it is believed by prominent scientists that there are at least four times this number of species, and some place the number as high as 350,000. The difficulties in the way of studying the Diptera or flies, are great, as the insects are very frail and satisfactory specimens are hard to prepare. It is safe to state that a large majority of the insects which affect the lives of men for good or for evil are of this order.



HEAD OF HOUSE FLY

The two large areas studded with thousands of lenses are compound eyes. There are three simple eyes at the top center. The fly can therefore see in every direction. In the center opening are the feelers, or antennae.

The midges, gnats, mosquitoes and fleas all belong to the Diptera, but in common language the word *fly* is often applied to insects which are not strictly Diptera, or true flies, as, for example, the dragon fly and the May fly. The house fly is the most common of the Diptera. Wherever man is, the house fly is found, and in hot weather it causes a great deal of annoyance. It is furnished with a sucking apparatus, through which a fluid may be poured to soften hard substances. It can climb the smoothest surfaces, and even walk on a ceiling, because of the sucker-like hairs which grow on its feet. The female lays her eggs in rotting refuse or in the manure of

a barnyard, and the larvae, which hatch in a few hours, are small white maggots, which change into pupae without casting their skins and in from eight to fourteen days become mature flies. As each fly lays more than one hundred eggs, and a new generation can be produced in ten days, it is evident that the increase is astonishingly rapid. A few flies survive the winter in sheltered places and so preserve the species, though it is probable that many of the pupae live through the winter. Flies are undoubtedly a source of contagion and an important factor in the distribution of disease. Not only do they gather the germs in the decaying matter where they lay their eggs and transport them by their bites into the human body, but by crawling over food they may leave the germs to be taken into the stomach. In Egypt and some of the Eastern countries, where the religion of the people prevents them from killing any insect, the flies carry the germs of ophthalmia from one person to another till it is unusual to find an adult human being with perfect eyes. Anthrax and other diseases are communicated among animals by flies, and it is thought that typhoid fever also is distributed in this way. It is very evident that flies should be excluded from the house wherever possible, and a consistent and universal effort to exterminate them would result in diminishing the nuisance very largely. See HORSE FLY; see also NATURE STUDY, Vol. VI, *Lessons on Insects*.

Flycatcher, a name given originally to a certain bird whose bill is flattened at the base and is almost triangular, notched at the upper mandible and beset with bristles. The bird perches on a branch, where it remains immovable, leaving only to make a sudden dart at a passing insect, which it seizes with a snap of the bill and then returns. Two species are British, and there are many tropical species, some of which are bright-colored, especially the paradise flycatcher, which is frequently represented on Japanese fans and screens. In the United States the tyrant birds, belonging to an entirely different family, but having much the same habits, are commonly known as flycatchers.

Flying Fish, a name common to various fishes which have the power of keeping themselves up for a time in the air by means of their large fins. To escape from the attacks of other fishes, especially the dolphin and the mackerel, they often pass through the air to a considerable distance, sometimes as far as two hundred yards. Among the best known species is that of the North Atlantic, also found near the Hawaiian

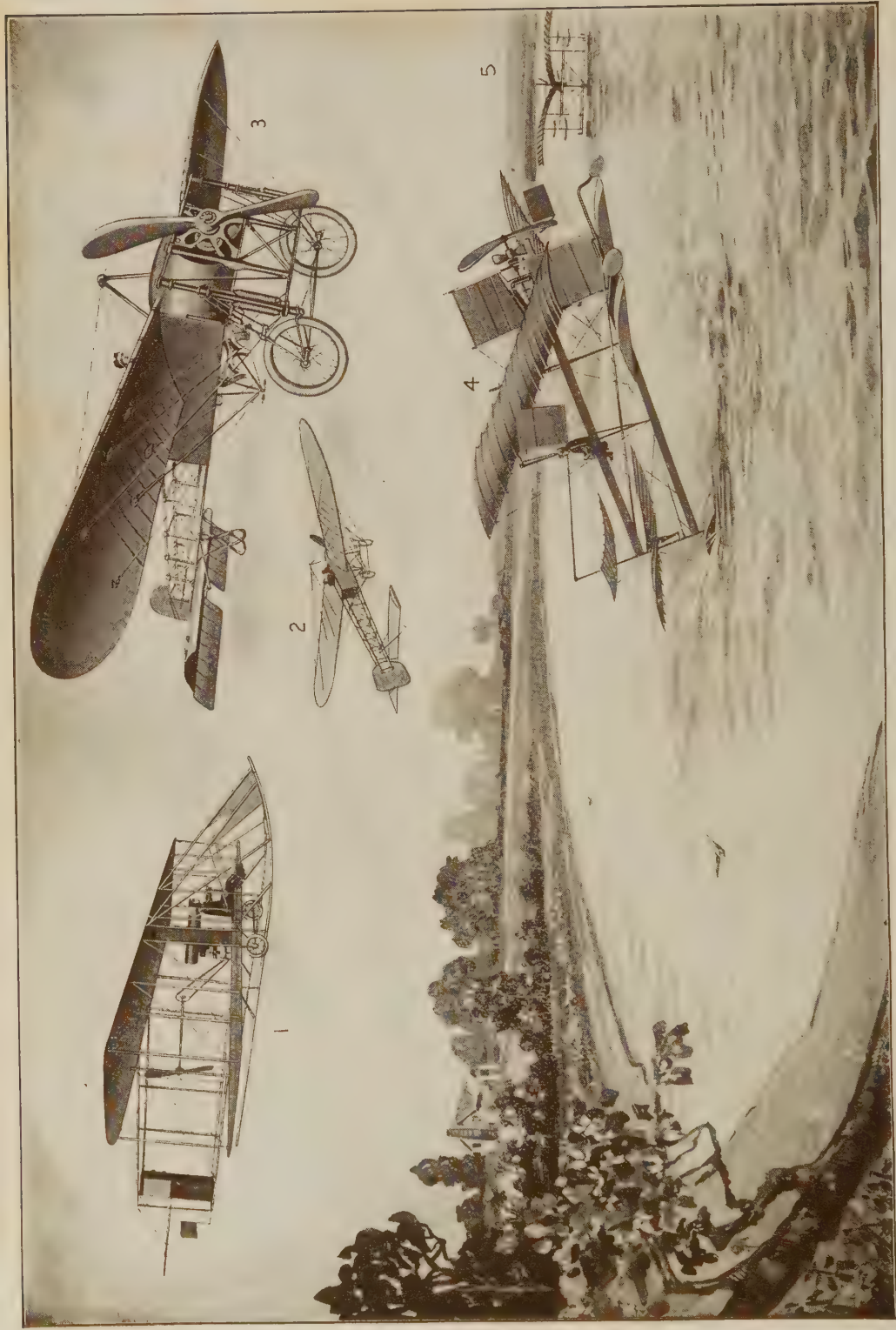
Islands; also the *great flying fish*, measuring eighteen inches in length, found around California, and the *sharp-nosed flying fish*, found around Central America.

Flying Machine, a device for navigating the air. Aviation, or travelling through the air, is accomplished by two kinds of machines—aeroplanes, which depend on mechanical action for their flight, and dirigible balloons, which are lighter than air.

MECHANICAL FLIGHT. The earliest experimenters with flying machines naturally enough tried to build a machine which resembled the wings of a bird. Indeed, the first machines of this type, which is known as the aerodrome, were made with movable wings, and the operator, by the use of the arms, attempted to imitate the motions of a bird in flight. It was soon recognized, however, that wings in a stationary position gave far better results. The wings were made by stretching silk over frames of wire, and had a moderate slope upward, being higher at the forward edge. The aerodrome was fitted with a motor and with a rudder for steering. By the use of a sliding weight on a rod extending lengthwise, the head of the machine could be given an upward or a downward tilt, so that it could ascend or descend at the will of the operator.

The most famous of the aerodromes was that built by Samuel Langley, later generally known as "Langley's folly." In December, 1903, Langley tried to fly, but the machine pitched headlong into the Potomac. In February, 1906, Langley died, broken-hearted. It was proved that his theories were correct, when Glenn Curtiss, on May 28, 1914, made a successful flight in the identical machine with which Langley had failed. Curtiss mounted the machine on floats and rose from water, whereas Langley had tried to rise from a platform by means of an elaborate launching mechanism.

AEROPLANES. The aeroplane depends entirely upon its reaction against the air for its support above the ground. It consists of one or more planes, consisting of a strong, light frame, covered with some light material, against which the air will react, and usually having a slightly curved surface. To the plane are attached by framework, motors, propellers, rudders and such other devices as may be necessary to enable the machine to keep its equilibrium in the air. Aeroplanes are of two general types, biplanes and monoplanes. The first is illustrated by the machine constructed by Wright brothers at Dayton, Ohio.



FLYING MACHINES

(1) Wright Monoplane. (2) Pictorial Monoplane. (4) Fabre Hydroplane descending to surface of water. (5) Hydroplane running on water.

The Wright Aeroplane. The Wright machine consists of two planes about forty feet long by six feet wide, and placed about six feet apart. The planes are connected by uprights, which are so joined to the planes and braced as to form a strong, light frame. The planes are mounted on two long runners, which extend in front about ten feet and curve upward in order to act as a support for the horizontal rudder, which consists of two small planes, one above the other. These planes are about fifteen feet long and two and one-half feet wide. This rudder is connected with a lever by the operator's seat, which is placed on the front edge of the lower plane. By moving this lever forward or backward, the operator directs the machine upward or downward at will. The frames of the large planes are flexible, and their outer ends are also connected with this lever. By moving the lever sidewise, the curvature at one end is increased, while it is lessened at the opposite end. This keeps the machine from tipping. There are two vertical rudders placed about the same distance in the rear as the horizontal rudder is in front, but operated by a separate lever. The aeroplane is driven by a thirty horse-power gasoline engine, which operates propellers, whose construction resembles that of boat propellers. One of these machines complete weighs 800 pounds and has an average speed of over forty miles an hour.

The success of the Wright machines has been proven in Europe and the United States. The right to use their patents was sold to the French government for \$100,000, and in October, 1909, Orville Wright, in an exhibition in Berlin, rose to the height of 1600 feet. During the Hudson-Fulton Festival in New York, Wilbur Wright made a flight from Governor's Island up the Hudson to Grant's Tomb and returned to his starting point. In the United States the machine has met the test of the army, and is being used in connection with the military balloon service.

The Curtis biplane is similar in plan and structure to the Wright machine, and is practically as successful. SEE BALLOON.

The Monoplane. This consists of only one large plane, otherwise its construction and operation are on the same principle as those of the machines described above. It was with a monoplane that Berliot crossed the English Channel July 25, 1909.

At the great aviation meet at Rheims, France, in August, 1909, thirty-eight aeroplanes were entered and these were about equally divided between biplanes and monoplanes.

The Hydro-aeroplane. This is an aeroplane built, not on runners, but on floats or on a hull so that it may rise from the water. The first successful hydro-aeroplane was that of the French aviator Fabre, who perfected his machine in 1910. The first successful American hydro-aeroplane was exhibited by Glen Curtiss in January, 1911. The Curtiss hydro-aeroplane of 1911 was equipped with floats in place of the usual landing skids, but the later models have a specially built, water-tight-body.

DIRIGIBLE BALLOONS. The dirigible balloon or air ship uses a bag inflated with gas lighter than air for raising it above the ground. The balloon, called the hull, consists of a long, cylindrical bag, pointed at both ends. The space enclosed may be occupied by separate bags, as in the Zeppelin ship, or it may be undivided as in balloons of the Lebaudy type.

The Zeppelin Air Ship. The Zeppelin air ship is the most perfect type of this class of machines. The hull has a strong frame, consisting of octagonal metallic rings, fastened together by wire cables. This renders the hull rigid and enables it to withstand wind pressure without damage. Within the frame are seventeen or eighteen drum-shaped bags, entirely distinct from each other but filling the entire space. The frame is covered with an air-tight envelope of the best balloon cloth. The air space between this envelope and the gas chambers within the frame is of great value in maintaining the gas in the chambers at equal volume, by keeping it at an even temperature. Rudders, which are practically small aeroplanes similar to those described, are attached to the sides of the hull fore and aft. A strong frame is suspended beneath the hull. This contains the motors, propellers, cabins for the operators and passengers, and such supplies as are necessary for the voyage. As usually constructed, the hulls of the Zeppelin ships are from 400 to 550 feet long and about 50 feet in diameter. They have a lifting power from four to five tons, carry two, three or four motors of about 200 horse-power each, and have an average speed of thirty-five miles an hour.

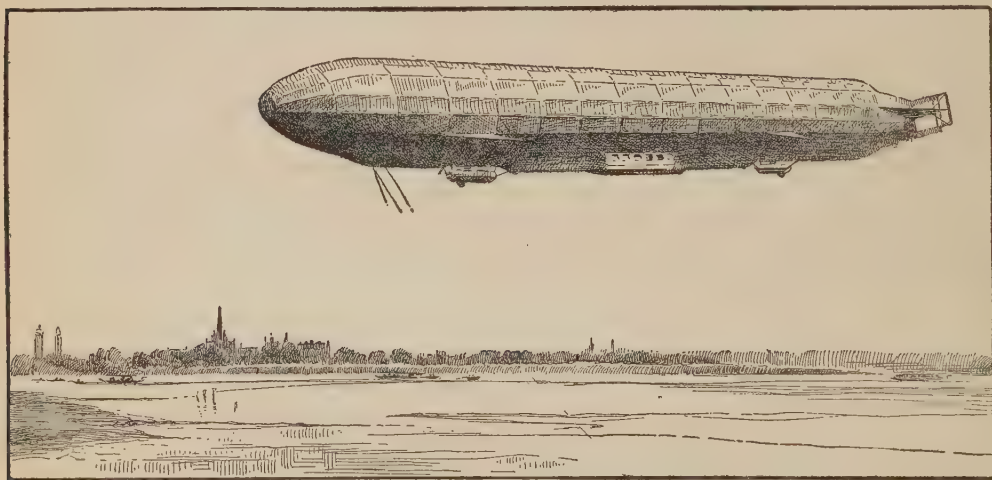
Previous to January, 1910, more than 200 voyages had been made by Zeppelin air ships, covering distances from 50 to 900 miles and varying in duration from one to thirty-six hours. A company was organized in Germany in 1909 for the construction of Zeppelin air ships, to be used in carrying passengers. From the beginning of this passenger service in June, 1910 up

to the end of 1913, seven dirigibles had been employed and about 25,000 passengers carried.

FLYING MACHINES IN WAR. For a number of years the various kinds of airships attracted attention because of their possibilities in war. The United States, Great Britain, Germany and France have been the leaders in experiments with aeroplanes and dirigibles. In the War of the Nations, which broke out in 1914, the aeroplane was used extensively for scouting purposes. Indeed, it is no exaggeration to say that the aeroplane has made impossible the secret movement of large bodies of troops. Military aeroplanes are usually equipped with one small machine gun, firing about 750 shots a minute, and each aviator in addition carries a revolver and rifle. In the use of the dirigibles Germany

fly, but it can run high up a tree and then leap out and, spreading its wings wide apart, sail for a considerable distance, perhaps to the foot of another tree. The flying squirrel of the United States is about five inches long, and has a tail of nearly the same length. The fur, which is very soft, is grayish on the upper parts and white below.

Fog or Mist, a cloud at or near the surface of the earth, produced by the condensation of the invisible vapor of the atmosphere into minute, watery particles. This condensation is caused by a cold current of air or the presence of a cold surface, as that of an iceberg. Fogs are more frequent in those seasons of the year when there is a considerable difference of temperature in the different parts of the day. Recent experiments would seem to show that there is an intimate



A ZEPPELIN AIRSHIP NEAR POTSDAM, GERMANY; DRAWN FROM A PHOTOGRAPH

has taken the lead, but the Zeppelins, in the early months of the war, did not prove of great assistance to the armies. They were used to drop bombs on Paris and other cities, but did little damage; they were also used for scouting, but were not superior, for this purpose, to the aeroplane. A dirigible usually carries a battery of three or four guns, considerably larger than those used on aeroplanes.

Flying Squirrel, a curious little squirrel that lives in the woods, where it sleeps during the daytime and hunts for food at night. If the stories are true, it does not confine itself to nuts and herbage, but eats the eggs of birds and even the young, when it can obtain them. The remarkable thing in its structure is the long flap of fur-covered skin that extends from the fore legs to the hind legs. The squirrel cannot really

connection between fogs and the invisible dust of the atmosphere; that in fact the invisible atmospheric dust is not only necessary to the formation of fogs, but also of clouds and rain.

Folk, JOSEPH WINGATE (1869-), 'an American statesman, born at Brownsville, Tenn. He graduated at Vanderbilt University and was admitted to the bar in 1890. Removing to Saint Louis, he rose rapidly in his profession, becoming circuit attorney in 1900. In this position he won fame for his vigorous and fearless prosecutions of bribery cases in the council. He was governor of the state as a Democrat from 1905 to 1909. In 1913 he was made solicitor of the Department of State at Washington, D. C. (See illustration on next page.)

Fo'menta'tion, in medicine, the application of warm liquids to a part of the body, by means

of flannels or other cloths, dipped in hot water or medicated fluids, for the purpose of driving tumors away or of easing pain by relaxing the skin.

Fond du Lac', Wis., the county-seat of Fond du Lac co., 63 mi. n. w. of Milwaukee, on Lake Winnebago and on the Wisconsin Central, the Chicago & Northwestern and the Chicago, Milwaukee & Saint Paul railroads. By way of the Fox River the city has water connection with the Great Lakes. The important manufactures



JOSEPH W. FOLK

include lumber, flour, paper, machinery, furniture and agricultural implements. The city has a picturesque location, contains a public library and Saint Agnes Hospital and Sanatorium, and is the seat of Grafton Hall, an Episcopal school for girls. The place was settled in 1836 and was chartered as a city in 1852. Population in 1910, 18,797.

Font. See TYPE.

Fontainebleau, *fohN tan blo'*, a town of France, in the Department of Seine-et-Marne, in the midst of a forest of the same name, about 2 mi. from the Seine and 37 mi. s. e. of Paris. The town is famous for its palace and its forests. The castle, or palace, of Fontainebleau is one of the most magnificent in France. It occupies the site of a fortified chateau, founded by Louis VII in 1162; this was converted into a magnificent palace by Francis I and was much enlarged by succeeding monarchs until its completion in the

eighteenth century. The park is laid out like a vast garden and is adorned with statues, temples, fountains, lakes and waterfalls. The forest, which is about 50 miles in circumference, covers an area of 42,500 acres, affords numerous pleasant walks and abounds with game.

Fontenoy, *foNt nwah'*, a village in Belgium, in the Province of Hainaut, celebrated for the battle of May 11, 1745, in which the French under Marshal Saxe defeated the British, Austrian and Dutch allied forces under the Duke of Cumberland.

Foo-chow'. See FU-CHOW.

Food, a term which includes everything, solid or liquid, that serves as nutriment for the body. All food must contain nutritious matter of some kind, which, being extracted by the act of digestion, enters the blood and supplies the material for growth and repair and for keeping up the heat of the body. It must also be composed in a greater or less degree of soluble parts, which easily lose their peculiar qualities in the process of digestion and correspond to the elements of the body. Foods have been classified usually as *flesh-makers* and *heat-makers*. The former, or nitrogenous foods, such as meat, the white of eggs, milk and cheese, foods rich in albumen, are known as proteids and albuminoids. The heat-makers, or non-nitrogenous foods, contain sugar, starch and oils. Some nitrogenous foods may be used as heat-makers in the absence of others. The albuminous substances are indispensable, inasmuch as they form the material by which the constant waste of the body is repaired. Water and salts are usually considered as forming a third group, and in the widest sense of the word *food*, oxygen alone, which enters the blood in the lungs, forms a fourth. The articles used as food by man do not consist entirely of nutritious matter, but with few exceptions are compounds of various nutritious, with indigestible and accordingly innutritious, substances. Albuminous substances are contained largely in animal food, but some vegetable foods also contain much albumen, as peas, beans and lentils, the cereals, wheat and oats. The principal non-nitrogenous substance obtained as food from animals is fat, and sugar is obtained in smaller quantities from milk. Sugar, water and salts may pass without any change into the circulatory system; but albuminous matter must first be rendered soluble and capable of absorption in the stomach and intestines. Starch must be converted into sugar, and fat must be emulsified, chiefly by the action of the pancreatic juice. One of the objects of

cooking is to make our food more easily acted upon by the digestive fluids.

Milk stands at the head of the list of foods, as it is rich in the best elements, in about the right proportion. Of the different kinds of flesh, each of which has its peculiar properties, beef is considered the most nourishing, while mutton and chicken are more delicate and more easily digested. Pork and veal are not very nutritious and are difficult to digest. The flesh of fish is rich in phosphorus. Eggs are a valuable food, rich in albumen, and contain some fat and sulphur. Vegetables, or those plants whose roots, stems or leaves are eaten, are best represented by the potato, which is cultivated in all parts of the world, except the very hot or very cold regions. It contains a large per cent of water, with starch and a small quantity of nitrogenous matter. Beets, carrots, parsnips, cabbage and turnips have a value, and some or all should form a part of a person's food. Fruits contain a large per cent of water, but they furnish sugar, and each has an acid peculiar to itself. Grapes are most valuable, and then come, in order, apples, cherries, pears, peaches and the small fruits, or berries. Seeds, such as peas, beans and lentils, contain a large proportion of nitrogen, while rice, wheat and oats have more starch. Rye and barley are not so valuable for food. Nuts are rich in albumen and fats and have a larger per cent of food material than the grains, but are not so easily digested. Starchy foods, such as sago and tapioca, are prepared from vegetables. Sugar is found in almost every form of vegetable food.

The wholesome or unwholesome character of any food depends, in a great measure, on the state of the digestive organs and also on the method in which it is cooked, a simple food often being made indigestible by poor cookery. The digestive power of the individual is always to be considered in determining whether a particular food is wholesome or not. In general, therefore, we can only say that that food is healthy which is easily soluble and is suited to the power of digestion of the individual. Man is fitted to derive nourishment from both animal and vegetable food, but can live exclusively on either. The people of hot countries live largely on vegetable foods, while the inhabitants of the most northern regions live almost entirely upon fat, on account of its heat-giving property.

Food should always be kept clean and should be handled with particular care to prevent the collection of impurities. This means not only

to protect it from visible dirt, but to be sure it contains no germ that will give disease to the person who eats it. Fruit and vegetables kept in dirty streets and peddled from dirty carts may carry the germs of consumption; water and milk may contain typhoid germs, and meats may have parasites that cause much trouble. They can be killed by thorough cooking. See DIETETICS; DIGESTION.

In late years powerful agitation has been developed in opposition to the adulteration or the fraudulent advertising or sale of foods and medicine. It was found that this practice had been followed with impunity by unscrupulous manufacturers and dealers in all parts of the country. Products of every description—milk, butter, flour, oils, spices, extracts, tea, coffee, preserved fruits, syrups, baking powders and many others—were found to contain foreign substances, often of the most injurious character. State laws against the sale and manufacture of such products were nullified in part by the lack of power to control the quality of products manufactured in other states and shipped direct to consumers. After a long fight in Congress, a national law was passed in July, 1906, prohibiting interstate or foreign commerce in injurious or fraudulent drugs, foods and liquors, and requiring each package of such products transported between states to be plainly and honestly labeled as to contents. Further, it was provided that where a package was marked as of a certain weight, it must contain that weight, absolutely and not approximately. The determination of the quality of foods and the amount and effect of injurious adulterants is to be determined by the courts in each case. See ADULTERATION.

Fools, FEAST OF, the name given to festivals regularly celebrated by the clergy and laity, from the fifth to the sixteenth century, in several countries of Europe. The feast of fools was an imitation of the Roman Saturnalia, and, like this, it was celebrated in December. The young people, who played the chief parts, chose from among their own number a mock pope, archbishop, bishop or abbot and consecrated him with many ridiculous ceremonies, in the chief church of the place, giving such names as Archbishop of Dolts, Abbot of Unreason, Boy Bishop, Pope of Fools. They often travestied the performance of the highest offices of the Church, while others, dressed in different kinds of masks and disguises, engaged in indecent songs and dances and practiced all possible follies in the church. Except from their association with the

Saturnalia, nothing is known of the origin of these extravagances, which appear to have been very ancient. They were most common in France, but the feast was also observed in Spain, Germany, England and Scotland. In France it survived till the year 1644.

Foot, a measure of length in the English system, containing 12 linear inches. A *square foot*, a unit of surface measurement, is equivalent to a square, each of whose sides is one foot, and is therefore equal to 144 square inches. A *cubic foot*, a unit of cubic measurement, is equivalent to a cube whose side is one foot, and it contains 1728 cubic inches. The foot is a common measure in various countries, but its dimensions vary considerably. It was originally derived from the length of the human foot, hence its name.

Foot, **THE**, in man and other vertebrate animals, the lower extremity of the leg, upon which the body rests in standing or walking. In man it extends from the ankle joint to the end of the toes. It includes the *tarsus*, or ankle, made up of seven bones, the *metatarsus*, or instep, made up of five bones, and the *phalanges*, or toes, each of which has three bones, except the great toe, which has but two.

Foot and Mouth Disease, a severe infectious disease, which for more than a hundred years has frequently broken out among cattle, pigs and other even-toed domestic animals in Europe and frequently has spread to Asia and Africa. Both mild and severe forms of the disease are known. In the former there is some fever and weakness, during which eruptions appear, especially in the mouth and between the hoofs. Not a large per cent of these cases are fatal, but in the graver form as high as twenty per cent of the animals affected may die. It is particularly fatal among young lambs, and in sheep the eruptions are more persistent and serious, especially on the feet. The bacterium which produces the disease has not been recognized, but it is known that infection may be carried by water and that the bacteria thrive in dark and damp places. Inoculation with serum has not been successful in either preventing or curing the disease. Whenever the disease has been present in a stable, the building should be disinfected and its use should be abandoned for a period. Milk from diseased animals conveys the contagion to man.

Football, a very general and favorite outdoor game, played in the cool weather of autumn. In the United States it is the popular sport in the colleges and public schools from the opening

of the fall term till about Thanksgiving time, and no game has ever attracted wider attention or been played with greater interest and vigor by the youth of any land. The game as played in the United States is the *American Rugby* game and differs materially from the Rugby football of the English school. Football is a very ancient game. The Greeks played it, and so did the Romans, the latter using both hands and feet, as do the players of the modern Rugby game. In its early days football was desperately rough, but had not developed into the highly scientific warfare that characterizes it to-day. The English game was played by the schoolboys of England for many years, but no uniformity of rule was known until about 1863; and in 1871, at a general conference, the games as now played in the United States and England were thoroughly outlined. The American game developed on lines of its own and has reached a stage of such remarkable perfection that the players can only achieve success by long and hard training and incessant practice. In the colleges, coaches drawing high salaries give their entire thought to the teams they are training during the fall season, and efforts are always being made to draw the promising athletes of the preparatory schools into the university teams. The important games between colleges or schools of any association draw out great crowds, who are wildly enthusiastic over the good plays made by their team, which they encourage by songs and yells without number. The enthusiasm of the students spread among the people, and to so great an extent that a general reformation in the game was called for, and in the winter of 1905-1906 committees of instructors, coaches and representative college men in different parts of the country consulted together, with the aim of so changing the rules and conditions of play as to eliminate unnecessary roughness and liability to injury; to emphasize the clean, forceful amateur contest in opposition to unsportsmanlike and professional play, and to improve the game from the spectator's point of view by giving greater opportunity to watch the movement of the ball while in play. To secure the desired ends many changes in the rules were proposed, the most important ones being directed toward increasing penalties for foul or rough play; increasing the distance through which the ball must be carried in three trials, thus encouraging "open" play; limiting the number of occasions when time can be taken out without incurring penalties; prohibiting linemen from dropping back of the line

until the ball is in play, unless they stand at least five yards from the line, thus discouraging dangerous mass formations.

The American Rugby game is played by two teams of eleven men each, on a field 360 feet long and 160 feet wide. This field is divided by a cross line in the center; and parallel to that line cross lines are drawn every 5 yards to the goal lines. A similar line is drawn through the center of the field lengthwise, and parallel lines follow this 5 yards apart, giving to the entire field a checker board appearance. In the middle of each end are two long, upright posts, more than 20 feet in height and 18 feet 6 inches apart. A horizontal crossbar 10 feet from the ground connects them. The object of the game is to carry the ball across the goal line of the opposing team or to kick it over the crossbar of the goal posts. When the ball is carried over the goal line, a *touchdown* is scored, and it counts six points for the team that carries the ball. After a *touchdown*, the ball is brought out into the field, and a member of the team that made the touchdown has what is known as a *free kick* for goal. If the ball passes over the crossbar between the goal posts, it scores one point. Under certain conditions the ball may be kicked over the crossbar from the field during the progress of the play, and by this three points are scored for the side making the kick. If a person holding the ball is forced across his own goal line, it is called a *safety* and scores two points for the opposing team. A game consists of four quarters of 15 minutes each, with an intermission of 15 minutes between the second and third periods, and one minute between the first and second and between the third and fourth. After every touchdown or goal from field, the teams change goals; at the beginning of the third period the teams take opposite goals from those assumed at the beginning of the game. At the beginning of a game the ball is placed on the ground at the center of the field. The side which has the right to kick off ranges itself in a line across the field, while the defending side distributes its men over its own side of the field, in positions which are most advantageous to catch and return the kicked ball. At a given signal the ball is kicked and the line of players rushes forward. One of the opposing players catches the ball and runs with it toward the goal of the kickers-off, as far as he may before he is "tackled" and thrown by one of his opponents. He need not have run with the ball, but might have kicked it back to his opponents, but as this would give

them possession of the ball, it is a play not often resorted to. When the player with the ball is downed, an official blows a whistle, and the two teams line up with their backs toward their own goals in the positions indicated in the following diagram, in which the squares represent the attacking team, and the circles the defending team. The men on a team are the *center* (C), two *guards* (G), two *tackles* (T), two *ends* (E), a *quarterback* (Q), two *halfbacks* (H) and a *fullback* (F). The men in pairs are distinguished by the word right or left, according as they stand to the right or the left of the center of their own team. Thus, the right guard stands at the right hand of his center. The names of the positions the men occupy are indicated on the diagram (Fig. 1) and, with slight modifications,

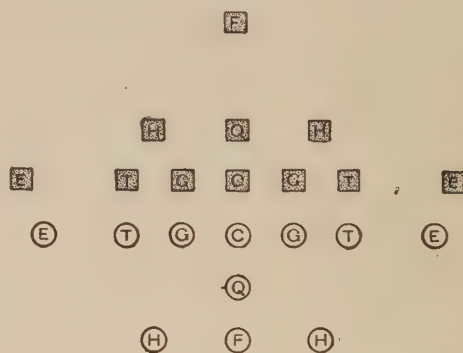


FIG. 1

are the positions they occupy whenever the teams are thus lined up for a scrimmage. The central men of the attacking team stand close together in a stooping posture, the center with his hands on the ball, which lies on the ground between his feet and in front of them. One of the players, usually the quarterback, calls the signals, which indicate what particular play is to be used. Then, after the quarter has signaled to the center that he is ready to receive the ball, the latter passes it quickly between his legs to the quarterback, who seizes it and gives it to one of the men behind him or to one of the men in the line, who takes the ball and attempts, with the aid of his companions, to run through or around the line of the defending team and toward their goal, until he is tackled and thrown. Here the teams form again for another scrimmage, when a new play is executed in a similar way. If within a specified number of trials a certain distance is not made, the attacking team must give up the ball to their opponents, who then become the attacking team and try to carry

Football

the ball toward the opposite goal. It is permissible for the attacking team to kick the ball instead of to carry it, if they prefer, and this is usually done, at least on the last trial, when, if they fail to make the required distance, the team would be obliged to give up its ball. Whenever a team comes within striking distance of its opponent's goal, it may form in a different manner and attempt either a *drop kick* or a *place kick*, and if either is successful a score is made as indicated above. If the kicker fails to make goal, the ball is brought out to the 25-yard line and there kicked off to the other team by the defenders of the goal, in the same manner as at the beginning of the game.

Football calls for great strength on the part of some of the players; for speed and agility from others, and for quickness of thought and loyalty to team-mates from all. No team can succeed that does not play as a unit. Each man must not only know the duties of his own position accurately, but he must know how to play it to the best advantage of the rest of the team and must know when and how to assist each of the others. When the signals are given and any specific play is called for, every man on the team knows exactly what he is expected to do, and the play is successful only when each man does as nearly as possible that which he is expected to do. The many competent coaches have succeeded in devising a great number of effective plays, which may be grouped in two classes, those special plays which are good only occasionally, or are in the nature of surprises, and the standard or regular plays, which are repeated again and again with only such slight modifications as are necessary to deceive the opposing team. Of the standard plays, two types are most common. In one of these the players try to carry the ball directly through the line of the opponents, and in the other they carry it around the end of the opponent's line. It is evident that both of these types are susceptible of a great number of variations, dependent upon the person who carries the ball and upon the particular point to which he directs his attack. Figure 2 shows what is done by the attacking team when the fullback tries to go between his center and right guard, and, with the assistance of the men behind him, carry the ball through the line of his opponents. The short double lines show where the ball is tossed; the black circle and the heavy black line indicate the man with the ball, and his course; the solid lines show the paths of the men who precede the ball,

Footo

and the dotted lines show the courses of the men who follow behind the ball and push. In Figure 3 the course of the players trying to take the ball around the right end is shown. The lines have the same meaning as in Figure 2. It

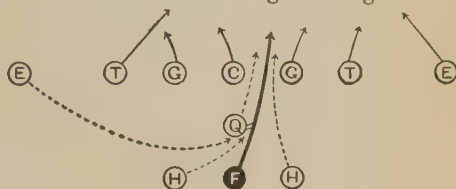


FIG. 2

should be noticed in this that the quarterback and the right halfback go between the men carrying the ball and the opposing team, to form what is called the *interference*.

Several officials are required to interpret and enforce the rules in each game—the *referee*, whose specific business it is to watch the ball;

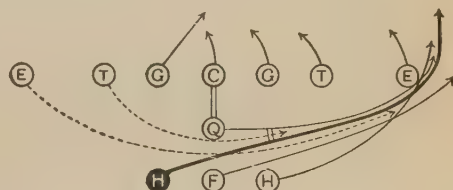


FIG. 3

the *umpires*, who watch the conduct of the players; the *linesmen*, who determine how far the ball has been advanced, count the time taken out and are also responsible for detecting certain classes of fouls, especially offside play and roughness. The football quarter consists of 15 minutes of actual play, and whenever the game is stopped for any reason, time is "taken out." The rules of the game are so numerous and complicated, and they change so from year to year, that the only way of being certain of them is to study the current manual.

Footo, ANDREW HULL (1806-1863), an American naval officer, born in New Haven, Conn. He studied at West Point and entered the navy December 4, 1822. He was promoted rapidly, being given command in succession of the Boston and the Brooklyn navy yards, and in December, 1852, he was given the rank of commander. He saw service with the East India squadron and in August, 1861, was given command of the fleet in the Southwest. In February, 1862, he coöperated with Grant in the capture of Fort Henry and bombarded Fort Donelson, but without effect. With Pope he compelled the surrender of Island

No. 10 in April. In July, 1862, owing to the serious effect of a wound received before Fort Donelson, he left the western fleet, became chief of the bureau of equipment and recruiting and in June, 1863, was appointed successor to Rear Admiral Dupont, in command of the fleet off Charleston, but he died before assuming the duties of this position.

Foote, ARTHUR (1853–), an American musical composer, born at Salem, Mass. He studied music with the foremost American teachers and also graduated from Harvard University. Soon after graduation, he appeared in concert, as performer upon the piano and organ, and also attained some distinction as a composer. Among his well-known compositions are the *Trio in C Major* for piano and stringed instruments; a *Serenade in E Major*; an overture, *In the Mountains*; many pieces for the organ and for church choruses, and about sixty songs, many of which are extremely popular, notably, *I'm Wearing Awa'*, *O Swallow, Swallow* and *In Picardie*. He also has written musical settings for well-known poems, including Longfellow's *The Wreck of the Hesperus*, *Skeleton in Armor* and *Hiawatha*.

Foote, MARY HALLOCK (1847–), an American author and artist, born in Milton, N. Y. She married a mining engineer and lived after her marriage in Colorado, Idaho and California. Much of the material for her novels she drew from her experiences there. *The Desert and the Sown*, *The Prodigal*, *Coeur d'Alene* and *The Led Horse Claim* are some of her works. She also produced many pen and ink sketches for magazine and book illustrations.

Foot Pound, in physics, the term expressing the unit selected in measuring the work done by a mechanical force. A foot pound is the work done by a force of one pound working through a distance of one foot. It is the unit of the English system for measuring force.

Foot Rot, a disease in the feet of sheep, the more common form of which is an extensive growth of hoof, which at the toe, or round the margin, becomes turned down and cracked or torn, thus affording lodgment for sand and dirt. In the second form of the disease the foot becomes hot, tender and swollen. Ulcerations form between the toes and are followed by the sprouting of proud flesh.

Foraminifera, a group of protozoans remarkable for their beautiful shells, some of which are spirally coiled and look like those of the nautilus. They resemble the amoeba in manner

of life, but reproduce themselves in all three of the ways recognized among protozoans. They live an independent life and move themselves about by a minute whip-like projection. Although some are found in fresh water, most of them are salt water animals. The animal deposits of chalk, found both in Europe and America, are composed principally of the fossil shells of foraminifera.

Forbes, forbz, ARCHIBALD (1838–1900), an English journalist, born in Scotland. He studied at Aberdeen, served with the Royal Dragoons and began journalistic work in London in 1865. As field reporter for the London *Daily News* during the Franco-German War, he accompanied the Prussian army throughout the campaign and entered Paris at the close of the struggle. He also served as war correspondent during the Servian War and during the Russo-Turkish War in 1877. Among his publications are a *Life of Chinese Gordon*, *Napoleon III* and *My Experiences in the Franco-German War*.

Forbes, JOHN, Sir (1787–1861), a Scottish physician, a homeopathist, phrenologist and believer in mesmerism. His first works were translations of the writings of Avenbrugger and Laennec on auscultation and the use of the stethoscope. To the *Cyclopaedia of Practical Medicine*, of which he was joint editor, he contributed some of the best articles. He was the founder of the *British and Foreign Medical Review* and published a number of professional and other works.

Forbes-Robertson, SIR JOHNSTON (1853–), an English actor, born in London and educated at Charterhouse and the Royal Academy of Arts. His intention was to become a painter, and he showed decided talent, but at the age of twenty-one he went on the stage, and gained steadily in art and in popularity until he became one of the foremost of English actors. At various times he played with Mary Anderson, Sir Henry Irving and Mrs. Patrick Campbell. Among the plays in which he was especially successful are *Hamlet*, *Pelleas and Melisande*, Shaw's *Caesar and Cleopatra* and *The Passing of the Third Floor Back*.

Force, fors, in physics, that agency by which the motion of a body is increased, diminished or changed in direction. In mechanics the force is measured by the velocity it produces in a given mass in a definite portion of time, as upon one pound of mass in one second. The illustration of the effect of a constant force upon a moving body is shown in the laws of falling bodies (See

FALLING BODIES). There are two systems for measuring force, the English system, which uses the poundal as the standard of measure (See **POUNDAL**), and the Metric system, which uses the dyne (See **DYNE**).

A central, or *centripetal*, force is one that draws toward the center; it is illustrated by gravitation, which draws all bodies toward a common center, about which they move. *Centrifugal* force is a term frequently used to denote the force which gives a revolving body a tendency to fly off in a straight line known as a *tangent*. A good illustration of this is a stone thrown by a sling, and mud or water thrown from the rim of a rapidly revolving wheel. The *field* of a force is the area within which it acts. In case of gravitation this field is infinite, but in mechanics it is restricted to the area within which the force produces visible effects, as the field of force of a magnet is the area within which its effects are noticeable (See **MAGNET**).

Force, for, **PETER** (1790-1868), an American scholar and historian, born at Passaic Falls, N. J. He became a printer in New York City, but soon removed to Washington, D. C., where, in 1820, he began the publication of the *National Calendar*, an annual periodical dealing with governmental statistics. This he continued to publish until 1836. During a part of the time he was editor and proprietor of a prominent National Republican newspaper. For a time he was mayor of the city of Washington. Force is most widely known for his *American Archives*, which were published by authority of an act of Congress and which deal with the history of the English colonies in America from 1765 to 1776. A large number of his books and pamphlets, dealing with American history and politics, were purchased by the United States government in 1867, and form a valuable part of the Library of Congress.

Force Bills, several laws passed by the United States Congress. The first became a law March 2, 1833; it aimed to compel the acceptance of the tariff law, especially by South Carolina, which had passed a resolution of nullification. The bill was also known as the "bloody bill."

During the reconstruction period, after the passage of the Fourteenth and Fifteenth Amendments, Congress passed a second so-called Force Bill May 31, 1870. It made punishable by fine or imprisonment any attempt to intimidate, bribe or hinder qualified voters from expressing themselves at the polls. April 20, 1871, another

bill, also known as the Force Bill, was passed by Congress, directed against the Ku-Klux Klan and similar societies, organized systematically to evade Federal laws in the South.

The name *Force Bill* has also been applied to the Lodge election bill, passed by the House of Representatives, July 2, 1890, by which the control of certain elections was placed with the Federal government. It was defeated in the Senate.

Forceps, *for'seps*, a general name for a two-bladed instrument, on the principle of pinchers, or tongs, used for seizing and holding and for extracting objects which it would be impracticable thus to treat with the fingers. Such instruments are used by watchmakers and jewelers in delicate operations, by dentists in forcibly extracting teeth and by surgeons for grasping and holding parts in dissection, for extracting anything from a wound and for taking up an artery. See **PINCHERS**.

Ford, **PAUL LEICESTER** (1865-1902), an American novelist, author of *The Honorable Peter Stirling*, *The True George Washington*, *The Writings of Thomas Jefferson* and *Janice Meredith*. Mr. Ford was born in Brooklyn, N. Y., was educated there in private schools and traveled extensively. He was a cripple and consequently did not enjoy the customary schooling. His attainments, therefore, are the more worthy and remarkable.

Foreclo'sure. See **MORTGAGE**.

For'eign Law. See **LAW**.

Foreign Money. See **MONEY**.

Foreign Trade. See **COMMERCE**; also, discussion of commerce in the articles on the several nations.

Foreshort'ening, in drawing and painting, the art of representing figures in such a manner as to convey to the mind the impression of the entire length of any object, though only a part of this length is actually shown. An object viewed in an oblique direction is foreshortened. In drawing an object in such a position, less space would be covered than if the object stood straight in front of and on a level with the observer. The method was known to the ancients, and in later times it was practiced by the great masters and especially by Correggio.

For'esters, **ANCIENT ORDER OF**, a fraternal society, founded in 1745 in Yorkshire, England. It was introduced into the United States in 1836, the first court being at Philadelphia. In 1911 there were in existence over nine thousand courts, with a membership of 1,292,900, of whom 43,500

were in the United States and Canada. The society has dispersed, since 1836, more than \$130,000,000 in benefits.

Foresters, INDEPENDENT ORDER OF, a fraternal organization, founded at Newark, N. J., in 1874 and reorganized in 1881. It has branches in Canada, Great Britain, Norway, France, India and Australia. There are 57 high courts, each having jurisdiction in one state or country. There are about five thousand subordinate courts, with a total membership of over 242,000. The organization has dispersed about \$32,000,000 in benefits.

Foresters of America, a fraternal society founded in 1864 and reorganized in 1889. It was formerly a part of the Ancient Order of Foresters, but became a separate organization at the latter date given above. It has 18 grand courts, about two thousand sub-courts, and a total membership of 235,000. Since its reorganization, it has dispersed about \$32,000,000 in benefits.

Forestry, the art of cultivating and managing forests. Forestry has been practiced in Europe for a long time, and in most European countries all forests, whether private or public, are under government supervision and must be managed in accordance with carefully prescribed regulations concerning the cutting of timber, the planting of trees and the protecting of young growths. Germany has the most perfect system of forestry, and her foresters are the best prepared and most skillful in the world.

The first settlers in the United States proceeded to clear the land by felling trees and burning the timber, because the forests were an obstruction to the cultivation of the soil. Timber was abundant, and there was little use for it; hence the most wasteful methods of disposing of it were adopted. Unfortunately, succeeding generations inherited the attitude of their ancestors towards the forests and for nearly two centuries the most ruthless destruction was continued. In 1890 active measures were taken to preserve the forests under government ownership. This led to the development of the division of forestry under the department of agriculture, and in 1901 this became the bureau of forestry. In 1905 the title became the forest service and the powers were greatly enlarged, enabling it to assume adequate control of the forests.

The work undertaken by the service is along the following lines: The creation and maintenance of forest reserves, the prevention of forest fires, the reformation of the present

methods of lumbering, the re-foresting of denuded areas, the assisting of private owners in caring for forests and woodlands, and co-operation with the different states in their attempt to preserve forests within their boundaries.

In 1891 Congress passed a law authorizing the president to set aside public lands wholly or partially covered with timber as national forest reserves. In accordance with this act, the Yellowstone Forest Reserve was proclaimed by President Harrison, and soon after, fourteen additional reserves were created by President Cleveland. Succeeding administrations have added to these, until forest reserves having a combined area of over 172,230,000 acres have been established. These are located in Alaska, Arizona, California, Colorado, Idaho, Montana, Nebraska, New Mexico, Oklahoma, Oregon, South Dakota, Wyoming and Washington. In addition to these there are a number of state reservations, which have been created by state legislatures. Most of the forest reserves are located around the head waters of the great rivers, such as the Mississippi, Missouri, Yellowstone and Columbia. The reserves are so managed as to enable them to contribute to the greatest good of all the people. Lumbering within the limits of the natural growth of the forests and under the direction of the agents of the bureau of forestry is allowed, as is grazing under certain conditions; but such regulations must be followed as will maintain the growth of the forests intact.

One of the most important works carried on by the forest service has been the prevention of forest fires. It is estimated that since the settlement of the United States more timber has been destroyed by fire than by the ax, and the annual loss by forest fires exceeds \$50,000,000. These fires are caused by accident, by carelessness in setting fires, by railways and by malicious burning, for the purpose of obtaining land for other uses. Many of these fires could easily have been prevented if they had received early attention from those living near where they originated. The forest service is creating a national and local public sentiment in favor of protecting forests from fire.

Other means of preserving the forests are to prevent the improper cutting of trees for lumber, wastefulness in the method of preparation and use of the trees already cut; to re-forest the districts that have been denuded, by the planting of new trees or by protecting young growths; to assist both the state governments and private

individuals in protecting and developing forests under their care. Several agricultural experiment stations, particularly those connected with the university of Minnesota, the Agricultural College of Michigan and with Yale and Harvard, have established courses in forestry. These schools are training experts, who expect to devote their lives to the work of forestry, and their services are in constant demand. See **FORESTS; LUMBER.**

For'ests, tracts of land covered with trees, though the term may be applied to a large tract of mingled woodland and open, uncultivated land. In England it is also applied to tracts of land reserved for game. The kinds of trees most numerous in any particular forest depend upon the temperature, the amount of moisture and the nature of the soil. In the forests of the cold temperate climates cone-bearing trees, such as pine, spruce and hemlock, are the most numerous. These are usually interspersed with beech, maple, birch and other hard woods. In the warm temperate climate deciduous trees, such as the oak, prevail, while the forests of the tropical regions are characterized by numerous species of palms. Mingling with these are found mahogany, teak and climbing plants of gigantic size. Each continent has extensive forests. In Europe, Russia, Germany, Switzerland and Austria have the largest area of woodland. In Asia, the densest forests are found in India, on the southern slope of the Himalayas. Large forests also occur in Siam and Burma and in the northern portion of the Chinese Empire and Siberia. South America contains the most extensive forests in the world. These are found in the basin of the Amazon. Another forest of nearly equal extent is that in the basin of the Kongo in Africa. In North America there are vast forests in Mexico, in the Central American states, in the Dominion of Canada and in the United States.

UNITED STATES. The forest areas of the United States cover a little more than one-third of the entire area of the country, exclusive of Alaska. These forests may be divided into the eastern, western and lake regions. The eastern forest region includes the area covered by the Appalachian mountain system and the Gulf states, extending in some places west of the Mississippi River. In the northern portion of this region and extending as far south as Maryland, white pine is the most abundant and most valuable timber tree. However, in the higher altitudes, spruce, hemlock and fir, commonly

known as Canada balsam, are found, and interspersed with these soft woods are maple, beech, birch and a few other hard woods. South of Maryland and continuing through the Gulf states, the yellow or pitch pine is the most abundant. Mingled with this are the cypress, the oak, the ash and a number of other hard-wood trees.

The forests of the lake region surround the Great Lakes and are found both in the United States and in Canada. In the United States they extend from near the Red River of the North, in Minnesota, eastward until they meet the forests of the Appalachian region of Canada. These forests cover large portions of Minnesota, Wisconsin and Michigan and are rich in white pine, the abundance of which has given rise to an extensive lumber industry in these states. Spruce and some varieties of hard wood are also found interspersed with the pine.

The Rocky Mountain forest region extends from the western boundary of the great plains to the Pacific coast and from the Canadian boundary to Mexico. The forests cover the foothills and sides of the mountains as far up as the tree line. They are often separated by wide, treeless regions, some of which are suitable for grazing, while others are barren. Various species of pine are the prevailing trees. On the western slopes of the Sierra Nevada and coast ranges, particularly the latter, the forests become very dense and contain trees of enormous size. The forests in this portion of the region are entirely different from those found in other parts of North America and constitute the immense lumber regions of Washington and Oregon. The redwood, Oregon pine and species of fir and sugar pine are the timber trees most highly valued. Some authorities consider the forests of Oregon and Washington, in proportion to their area, the most valuable in the world.

The mountains and hills of Alaska are covered with a heavy growth of timber, but the trees are smaller than those found in Washington and Oregon. However, they compare favorably in size with those in the forests of the Appalachian region and are suitable for lumber. The Philippine Islands have a forest area exceeding 40,000,000 acres. This is rich in merchantable timber and, with but few unimportant exceptions, the entire region is in possession of the United States and under control of the forest service.

VALUE OF FORESTS. Forests furnish fuel and building material, also material for dyes, medicines and a large number of other useful articles. But their greatest value consists in their influence

upon the climate of the open country, in or near the regions in which they are located. The thick matting of dead leaves and branches, which covers all forest areas, prevents rapid evaporation and enables the water which the ground receives from rain and melting snow to flow out gradually through springs and rivulets. The moist atmosphere caused by this soil and the exhalation of vapor through the leaves also increases the rainfall of a locality. Forests equalize the flow of water in streams and springs. As long as they remain, this flow is comparatively regular throughout the year, but as soon as they are cut away the rapid evaporation from the soil causes these streams to become dry or nearly so during certain months of the year, while the compactness of the soil, because of its dryness, causes water from heavy rains and snow to run off rapidly into the valleys. Thus, during the spring, and in case of heavy rains in the summer, freshets are common along all streams from whose sources forests have been removed. See FORESTRY; LUMBER.

Forge, *forj*, a workshop or other establishment in which iron or other metal is hammered and shaped by the aid of heat. In the ordinary forge the iron is heated in a small fire, through which a blast of air is driven by a bellows and is shaped by the smith on an anvil. Large forges with steam hammers are connected with works where iron and steel are worked in large quantities.

Forgery, *for'jur y*, at common law, the fraudulent making or alteration of a writing or instrument, to the prejudice of another man's rights. The punishment of forgery at common law is as for a misdemeanor, by fine, imprisonment and such other corporal punishment as the court in its discretion shall award. Most, and perhaps all, of the states in the Union have passed laws naming certain acts as forgery, and the national Congress has also enacted several on this subject, all providing additional punishment in cases enumerated in the statutes.

Forget-me-not, an annual or perennial herb, common in the United States and in England. Nearly fifty species are known. Its flowers are bright blue with a yellow eye. The dark blue forget-me-not of the Azores is now cultivated in greenhouses and is much esteemed for its brilliancy. An interesting fact is that this plant has the same name in many languages, and that its flowers are the world over a symbol of friendship. The forget-me-not is sometimes called *scorpion grass*.

Fork, a tool having prongs and a handle in line with them. Forks are used for lifting objects which cannot be conveniently moved by the hand, such as hay and grain on farms, meat in a boiling pot and brands in a fire. Hay and grain forks have from two to six prongs, fixed to a long wooden handle. Table forks were invented much later than the patterns named above.

Formaldehyde, a compound of oxygen, hydrogen and carbon, obtained by the oxidation of wood alcohol. In other words, formaldehyde is wood alcohol with the hydrogen removed. Pure formaldehyde is never obtained, the chemical process yielding a solution of 35 parts of formaldehyde to 65 parts of water. Formaldehyde solutions, often under the name of *formalin*, are used as disinfectants and in the manufacture of certain dyes and other chemicals.

Formic Acid, an acid so named because it was first obtained from the bodies of ants (Latin *formica*) by steeping them in boiling water. The same acid is contained in human sweat, in the common nettle and in other plants and may be prepared artificially in various ways. It is a colorless, volatile liquid, with pungent odor.

Formosa, an island in the Chinese Sea, belonging to Japan, and separated from the Chinese province of Fukien by a strait about 80



FORGET-ME-NOT

miles wide at its narrowest point. The island is about 250 miles in length and 70 miles in average breadth. It is divided by a central range of mountains, with peaks from 7000 to 15,000 feet high, into a western and eastern part, the former

of which is occupied by Chinese and is highly cultivated, producing in abundance corn, rice, sugar, pepper, camphor, oranges and bananas. The eastern part is inhabited mainly by wild tribes of the Malayan race, who are gradually disappearing before the Chinese. Four ports have been open to European commerce since 1858, namely, Tainan, the capital, Tamsui, Kelung and Takow. The trade of the island since then has greatly increased. The chief exports are coal, tea, camphor, sugar, indigo, hemp and timber; the imports are cotton and woolen goods and opium. The Dutch exercised power over part of Formosa in the seventeenth century. It was ceded to Japan by China in 1895 at the close of the China-Japanese War. Population in 1912, 3,443,679.

Forms of Address'. See ADDRESS, FORMS OF.

Forrest, EDWIN (1806-1872), an American actor, born in Philadelphia. He showed an early talent for the stage and in 1820 made his debut at Philadelphia, as the hero in Home's play of *Douglas*. In 1826 he appeared before the New York public as Othello, with signal success. In 1836 he visited England, and he later made a second and a third visit. He continued with great success at New York till 1871, when he retired. His chief characters were Othello, Lear, Coriolanus and Richard III.

Forrest, NATHAN BEDFORD (1821-1877), an American soldier, born at Chapel Hill, Tenn. At the outbreak of the Civil War he enlisted in the Confederate service, raised a regiment of cavalry and was put in command of the Confederate forces at Fort Donelson. He took an active part in the Battle of Shiloh, where he was wounded. On July 13, 1862, he made an attack upon Murfreesboro and captured the city, and soon afterwards he was commissioned brigadier general. In 1864 he captured Fort Pillow, which was held by about five hundred Federals under Major Booth. Forrest's first assault was unsuccessful, but Booth was killed, and Bradford took command. Forrest sent in a flag of truce, demanding a surrender, and when this was refused he made a second assault and gained an entrance. Nearly the whole garrison was killed, and this won for Forrest an unfavorable reputation. See FORT PILLOW.

Forster, JOHN (1812-1896), an English politician and historical writer. He succeeded Dickens in 1846 as editor of the *Daily News*, and in the next year he became editor of the *Examiner*. Among his works are *Lives of the Statesmen of*

the Commonwealth; *Sir John Eliot: A Biography*; *The Life and Adventures of Oliver Goldsmith*; *Walter Savage Landor*, and *The Life of Charles Dickens*.

Fort. See FORTIFICATIONS.

Fort Dearborn, a fort built on the site of the present city of Chicago in 1804 (See CHICAGO, subhead *History*). It was the scene of a massacre on August 15, 1812, when the garrison of 67 men and some thirty settlers evacuated the fort under orders from General William Hull. They were attacked in ambush by a force of 500 Indians, assisted by others who had promised to escort them to safety, and fully two-thirds of the party were killed. The fort was destroyed on the following day by the Indians, was rebuilt in 1816 and was demolished in 1856. The story of this massacre is told without historical accuracy in Randall Parrish's novel, *When Wilderness was King*.

Fort Dodge, IOWA, the county-seat of Webster co., 87 mi. n. w. of Des Moines, on the Des Moines River and on the Illinois Central, Chicago Great Western and other railroads. Extensive deposits of gypsum are found here and the city has the largest gypsum mill in the world. Other manufactures include brick, tile, sewer pipe, stoneware, office fixtures, automobiles, carriages, clothing, brooms and pumps. Population in 1910, 15,543.

Fort Donelson. See FORT HENRY AND FORT DONELSON.

Fort Duquesne, du kane', a fort erected by the French in 1754, at the junction of the Allegheny and Monongahela rivers in Pennsylvania. It became at once the center of French military authority in the region drained by the Ohio River and its tributaries. It was for the purpose of reducing this fort that the ill-fated expedition under General Braddock set out in 1755 (See BRADDOCK, EDWARD). Another English expedition of 800 men, for the same purpose, was almost destroyed in October, 1757, and the fort was finally captured in September, 1758. The name of the fort was changed to Fort Pitt, in honor of the great English statesman.

Fort Fisher, an earthwork thrown up by the Confederates on the peninsula between the Atlantic Ocean and the Cape Fear River, at the entrance to the port of Wilmington, N. C. This port was one of the last to be held by the Confederates, but fell on January 5, 1865. The fort was bombarded by a fleet under Admiral Porter late in December, 1864, and it was at this time that the famous episode of the explosion of the

powder boat *Louisiana* took place. A force was landed under General Butler, but did not accomplish the capture of the fortress and was compelled to reëmbark. Another force under General Terry was landed in January, 1865, and after a continuous bombardment of more than three days the fort was captured with two thousand prisoners and more than 150 guns. The Confederates thereupon destroyed the remaining fortifications about Wilmington and evacuated the town.

Forth, an estuary of Scotland. The river is formed in Perthshire by the junction of two streams, the Duchray and the Dhu, about 1 mi. w. of Aberfoyle. From Aberfoyle the river flows southeasterly, forming for a considerable part of its course the boundary between the counties of Stirling and Perth, winding in its lower course in a series of curves, known as the Links of Forth, and expanding thereafter into the Firth of Forth, which forms the most important harbor or refuge north of the Humber. The Firth is 50 miles long and 15 miles across. At Queensferry a great cantilever bridge, 8295 feet long, crosses the Firth.

Fort Bridge, a railway bridge across the Firth of Forth, in Scotland. It is of the cantilever type (See **BRIDGE**, subhead *Cantilever Bridges*) and on account of the length of its spans is one of the most remarkable bridges in the world. It has two short arms of 680 feet each, two main spans of 1710 feet each, fifteen spans of 168 feet each and seven small arches. The total length is 8295 feet, or one and a half miles, one mile of which is covered by the cantilevers. The highest point is 361 feet, and the center of the bridge is 152 feet above high water. This bridge was completed in 1889 at a cost of \$13,000,000.

Fort Henry and Fort Don'elson, two forts in Tennessee, near the Kentucky border, the first situated on the right bank of the Tennessee River and the second on the left bank of the Cumberland River. They were erected by the Confederates in 1861 and were important posts, controlling, as they did, the entrance to avenues of approach to the Central and Southern states. February 6, 1862, General Grant and a land force, assisted by Commodore Foote's river fleet, compelled the surrender of Fort Henry. Most of the garrison, however, escaped to Fort Donelson. Grant advanced upon the latter on the twelfth, and began a vigorous bombardment on the fifteenth, supported on the following day by a bombardment of the fleet. In the night Gen-

erals Floyd, Pillow and Forrest, with about two thousand men, escaped, leaving Buckner in command. On the following morning, Buckner proposed an armistice and requested the terms of surrender. To this Grant made his famous reply, "No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." Buckner at once surrendered fully fifteen thousand men and a large quantity of ammunition.

Fortifica'tion, the science of strengthening positions in such a way that they may be defended by a body of men much inferior in number to those by whom they are attacked; and more particularly, the science of strengthening positions so that they may be held against the assault of troops supported by artillery. Fortifications are usually classed as permanent or temporary. *Permanent* fortifications are works required to remain effective for a considerable time, for the purpose of defending important positions and cities, dockyards or arsenals. *Temporary* fortifications are such as are designed merely to throw temporary obstacles in the way of the enemy. Modern scientific fortification had its beginnings in the work of the great French engineer Vauban, who worked under the direction of Louis XIV.

Permanent fortifications are constructed on the principle that each part must support and must be supported by some other part; that the works must protect the defenders from the enemy's fire as well as possible, and that the fire of the fortress must completely sweep all parts of the ground in front of the fortified lines. Some idea of permanent fortifications may be obtained from the following description: Around the place to be defended is raised a mound, or bank of earth, called a *rampart*, on the upper surface of which the troops and cannon are placed. This surface is protected from the enemy's fire by a breastwork, or *parapet*, about 8 feet high, sometimes pierced at certain intervals with *embrasures*, through which the guns are fired. Beyond the rampart is the *ditch*, usually about 12 feet in depth, but varying greatly in width. Sometimes this ditch is filled with water, but in other cases it is dry. The outer wall of the ditch is called the *counterscarp*; the inner wall, the *scarp*. From the top of the counterscarp the embankment slopes outward and forms the *glacis*. The slope of the glacis is so constructed as to bring the assailants into direct line of fire from the artillery on the ramparts. Often at certain intervals there are *bastions*, or projecting works,

Fort Madison

at such angles that their fire will command the straight portion of the fortified line between them. A single fort, such as has been described, is not now considered sufficient defense, on account, mainly, of the long range and high proficiency of modern cannon; hence, it is customary to surround the place with a line or with lines of detached forts at some distance away. Fortifications intended to ward off attacks by sea are now commonly protected on the sea face by plates of iron or steel.

Temporary, or field, fortifications vary much, according to the time allowed for construction and the length of time during which they may prove useful. Among works of this nature are the *redan*, which consists of two parapets, with a ditch in front, forming an angle facing the enemy; the *lunette*, which is a redan with short flanks; the *redoubt*, a closed work with a ditch and parapet all around it. As none of these works has a flanking fire in itself, they have to be disposed so that they flank each other within rifle range. To do this effectually, and to strengthen the whole line, the plan generally adopted is to form an entrenched camp by a line of square redoubts, flanking each other, and also a line of simple redans, in front of the intervals of the redoubts. When the time is not sufficient to throw up such works, simple forms of intrenchment, such as shelter trenches, are used to protect troops or oppose the enemy's advance. A very shallow trench, with the earth thrown to the front, so as to afford shelter to one man lying in it, may be made in somewhat less than half an hour; more elaborate forms in about one hour. By placing a man at every four feet, active troops can make good shelter for themselves in an hour. To impede the enemy's advance, an abatis of felled trees may be used, also wire entanglements.

Fort Madison, IOWA, the county-seat of Lee co., 18 mi. s. w. of Burlington, on the Mississippi River and on the Atchison, Topeka & Santa Fé and the Chicago, Burlington & Quincy railroads. The city has pork-packing establishments, railroad shops, flour and lumber mills and manufactures of agricultural implements, automobiles, shoes and other articles. Here is the state penitentiary and the Catermole Memorial Library. Fort Madison was settled in 1832, on the site of a fort which had been built in 1808. Population in 1910, 8900.

Fort Mims, MASSACRE OF, a massacre perpetrated during the Creek War at Fort Mims, near Mobile, Ala., Aug. 30, 1813. The garrison, including about 550 men, women and children,

Fort Niagara

was surprised by a greatly superior force of indians under Wethersford, a half-breed. All except 15 were killed.

Fort Monroe' or Fortress Monroe, a military post of the United States, at Old Point Comfort, Elizabeth City County, Va., at the entrance of Hampton Roads. It is on a reservation of about 300 acres and has quarters for 50 officers and 600 men. Jefferson Davis was imprisoned here for two years after the Civil War. See DAVIS, JEFFERSON.

Fort Moultrie, *mole'tre*, a fort on Sullivan's Island, at the entrance to the harbor of Charleston, S. C. Early in the Revolutionary War, a force of British regulars under Sir Henry Clinton and a fleet under Sir Peter Parker proceeded to Charleston with the view of using the city as a base of operations for the isolation of the southern colonies. Upon arrival they were confronted by a force of 6500 Americans, about 450 of whom were under Colonel William Moultrie and were stationed in a fort known as Fort Sullivan, on Sullivan's Island. Parker opened fire upon the fortress, and Clinton took up a position on a neighboring sand bank, with the intention of landing troops when the guns at the fort had been silenced. After a contest of more than ten hours, the British were forced to withdraw and to abandon temporarily the invasion of the south. The name of the fort was later changed to Fort Moultrie. It surrendered to the British, May 7, 1780.

A United States garrison occupied Fort Moultrie at the opening of the Civil War, but on December 26, 1860, Major Anderson removed the troops to Fort Sumter, which was better prepared to withstand a bombardment. The South Carolina militia thereupon took possession of Fort Moultrie and used it in the defense of Charleston.

Fort Niag'ara, a fort on the American side of the Niagara River, near its mouth, upon the site of a trading post built by La Salle about 1669. In 1725 a Frenchman, Vandreuil, built Fort Niagara, which became the most important military station and the greatest trading center in America. It was attacked during the French and Indian War by a British expedition, under Governor Shirley of Massachusetts, and was captured by another expedition in 1759. It was the center of British influence among the indians during the Revolution, and many expeditions against the frontier were directed from this point. It was evacuated by the British in August, 1796, and was immediately occupied by

Fort Pillow

the Americans. During the War of 1812 it was bombarded and was captured by the British December 19, 1813, but was again surrendered after the close of the war. The United States garrison was withdrawn in May, 1826.

Fort Pillow, a fort on the east shore of the Mississippi River, in Tennessee, about 40 mi. n. of Memphis. It was constructed by the Confederates under General Pillow in the spring of 1862, but was abandoned in May and was occupied by the Federals in June. In April, 1864, it was attacked by a strong Confederate force under General N. B. Forrest, a famous cavalry leader. The garrison, which was comparatively weak, fought stubbornly for many hours, but was finally overpowered and practically annihilated. The charge has been made that the Confederates deliberately murdered Federals after the surrender, but this was denied by General Forrest and his officers, who claimed that the fearful slaughter was due to the reckless efforts of the Federals to resist capture.

Fortress Monroe. See FORT MONROE.

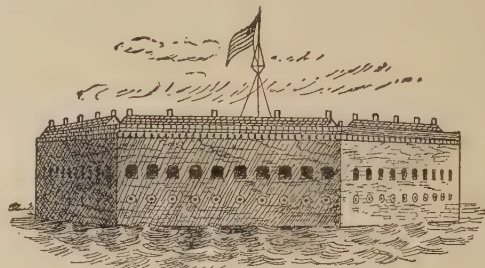
Fort Scott, KAN., the county-seat of Bourbon co., 100 mi. s. of Kansas City, on the Marmaton River and on the Missouri Pacific, the Missouri, Kansas & Texas and other railroads. The city has foundries, machine shops, flour mills and grain elevators and is in a region having deposits of coal, flagstone, cement rocks, mineral paints, zinc and lead. It supports a public library and Mercy Hospital and is the seat of the Kansas normal college and an academy for girls. Population in 1910, 10,463.

Fort Smith, ARK., one of the county-seats of Sebastian co., at the junction of the Arkansas and Poteau rivers, on the Saint Louis & San Francisco, the Missouri Pacific and other railroads. The city has sawmills and cottonseed-oil mills and extensive manufactures of furniture. It does a large wholesale business in groceries, meats and household goods and has a large trade in coal, corn, cotton, lumber, live stock and hides. Fort Smith was settled in 1838 and was chartered as a city of the first class in 1886. Population in 1910, 23,975.

Fort Sumter (named after Thomas Sumter, a partisan leader in the Revolutionary War), a fort at the entrance to Charlestown Harbor, S. C. When South Carolina seceded in December, 1860, Major Anderson, who commanded the defenses in the harbor, abandoned the other forts and occupied Fort Sumter, with a garrison of eighty men. On April 12, 1861, after prolonged negotiations between Anderson, the

Fort Wayne

South Carolina authorities and the government at Washington, General Beauregard opened fire on the fort, which surrendered on the 14th of the same month. This was the beginning of the Civil War. The Confederates greatly strengthened the fort, and it resisted several attacks, but was evacuated in February, 1863. On



FORT SUMTER—BEFORE THE CIVIL WAR

April 14, 1865, Major (then General) Anderson raised the same United States flag over the fort that he had lowered exactly four years before. It has been rebuilt on a modified plan.

Fortu'na, the Roman goddess of chance, called by the Greeks *Tyche*. She was generally



FORTUNA

represented with a rudder, the sign of her guiding power; or, later, sitting or standing on a wheel or globe, with a bandage over her eyes and a scepter in her hand.

Fort Wayne, IND., the county-seat of Allen co., 95 mi. s. w. of Toledo, Ohio, at the junction

of the Saint Mary's and Saint Joseph's rivers, where they form the Maumee, and on the Lake Shore & Michigan Southern, the Wabash, the Pennsylvania, the Grand Rapids & Indiana and other railroads. It is one of the most important railroad centers in the state. The city is in an agricultural district and has railroad shops, flour mills and bakeries, foundries, packing houses, lumber mills and other factories. The largest mill in the world devoted exclusively to the manufacture of hosiery is here. Fort Wayne is on the site of the principal village of the Miami Indians and is near the location of the old French Fort Miami. About 1794 General Anthony Wayne built another fort here, and a village gradually grew up around it. It was chartered as a city in 1839, but developed very slowly until after the construction of the Wabash and Erie Canal and several railroads in the decade following 1850. The United States census of 1910 established the geographical center of manufactures at a point ten miles west of Fort Wayne. Population in 1910, 63,933.

Fort William, a city of Ontario, Canada, situated at the head of Lake Superior and on the Grand Trunk Pacific, Canadian Pacific and Canadian Northern railways. It is one of the largest trade centers of Canada, is a distributing and shipping point for the grain areas of the west, and is a leading manufacturer of flour, brick, tinware, furniture, lumber and other commodities. Population in 1911, 16,499.

Fort Worth, Tex., the county-seat of Tarrant co., 30 mi. w. of Dallas, on the Trinity River and on the Chicago, Rock Island & Pacific, the Texas & Pacific, the Fort Worth & Denver and other railroads. The city is in a vast stock-raising country and is an important cotton market. The principal industries include packing houses, flour mills, tanneries, breweries, railroad shops, foundries, cotton mills and other factories. It is the seat of Fort Worth University, Polytechnic College, Saint Ignatius Academy, Fort Worth Medical College, an academy of music and two business colleges. Fort Worth was settled in 1849 and was incorporated in 1872. Population in 1910, 73,312.

For'um, among the Romans, any open place where the markets and courts of justice were held. There were a number of such places in Rome, the most celebrated, by far, being the great Roman Forum, between Mount Palatine and the Capitoline Hill, which formed the political and commercial center of the city. Surrounding this were the temples of Saturn and of

Concord, the Basilica Porcia, the first courthouse, built in 184 B. C., and many other beautiful buildings. Though this Forum escaped the devastations of the fifth century, it became almost a waste in the Middle Ages, but of late years the government has made clearances and excavations and has taken charge of the valuable relics which are left. In legal phrase, *forum* signifies the court or place where an action is instituted.

Fossil, the name of petrified forms of plants and animals, found in the rock formations of the earth. Most of the fossils are of species that have long since been extinct, and their study is of the greatest importance to the geologist, since they reveal to him the forms and conditions of life at different periods in the world's history. From the study of fossils it is pretty definitely determined that plant life existed before animal life, and in all cases the simplest forms of life are those which first appeared. These consist of the very lowest orders, such as seaweeds and rushes, among plants, and the simplest mollusks, among animals.

From these simple forms both vegetable and animal life increased in complexity and importance as conditions for the existence of higher orders appeared. The animal fossils are more easily traced than the plant fossils. A study of these shows that no vertebrate animals appeared before the Silurian period, and during the latter part of this and the Devonian period the fishes reached their highest development. These were followed by the reptiles, which in turn were followed by birds, and these by the mammals, which were the progenitors of existing species. The study of fossils also shows that each period in the world's history has been characterized by some special form of life, which at that time reached its highest development; thus, the fishes distinguish the Devonian age, and the reptiles, the age that followed. A study of the fossils of plants shows the same progress from the simplest forms to existing species. See GEOLOGY; PALEONTOLOGY.

Foster, JOHN WATSON (1836-), an American statesman and diplomat, born in Indiana and educated at the University of Indiana. He was admitted to the bar, served in the Union army, entered journalism and was minister to Mexico (1873-1880). Thereafter he represented the United States on various special diplomatic missions and became secretary of state in 1892. He represented the United States at Paris at the Bering Sea court of arbitration in 1893; par-

ticipated in negotiations for peace between China and Japan in 1895, by invitation of the emperor of China, and was agent of the United States before the Alaskan Boundary Commission. He is the author of *A Century of American Diplomacy* and *American Diplomacy in the Orient*.

Foster, MURPHY JAMES (1849-), an American politician, born at Franklin, La. He studied at Washington and Lee University, graduated at Cumberland University and from the law department of Tulane University. He engaged in practice in his native town, was elected to the state senate in 1880 and served for twelve years, winning special distinction as a tireless opponent of the state lottery. From 1892 to 1900 he was governor of the state, in the latter year was elected United States senator and was reelected in 1906.

Foster, STEPHEN COLLINS (1826-1864), a song writer, born near Pittsburg, Pa. Without any formal training in music, Foster composed more than one hundred seventy-five songs, usually both words and music. For *The Old Folks at Home* (*The Swanee River*), he is said to have received only five hundred dollars. The most popular of his other songs are *My Old Kentucky Home*, *Nellie Was a Lady* and *Massa's in the Cold, Cold Ground*.

Fosto'ria, OHIO, a city in Seneca and Hancock counties, 35 mi. s. e. of Toledo, on the Baltimore & Ohio, the Lake Erie & Western and several other railroads. It has flour and planing mills, brass and iron works and manufactures of glass, carriages, electro-carbons and other articles. It is in a fertile farming region and is near the oil fields. Population in 1910, 9597.

Foucault, foo ko', JEAN BERNARD LEON (1819-1868), a French physicist. His name is especially connected with a celebrated pendulum experiment, employed as a method of showing the rotation of the earth on its axis. He also made important discoveries in optics, electric lighting and photography and invented the gyroscope and the polarizing prism known by his name.

Fouche, foo sha', JOSEPH, Duke of Otranto (1754-1820), a French politician. Soon after the outbreak of the French Revolution he identified himself with the more radical party, was elected to the national convention and took a part in the trial and execution of Louis XVI. As commissioner at Lyons he was guilty of the most extreme cruelty. After holding several other offices, he was made in 1799 minister of police,

and this office he continued to hold after Bonaparte was made consul. He seems during this later period to have been more moderate in his methods than in the early stage of the Revolution. When Napoleon became emperor he made Fouché minister of the interior and head of the police force, but both of these offices he lost by carrying out a policy of which Napoleon did not approve. Finally Napoleon became so incensed against him that Fouché was obliged to flee from France, and he returned after the Bourbon restoration. When Napoleon returned from Elba, Fouché, although he was at heart in favor of the Bourbons, threw in his lot with Napoleon. After the second restoration he served for a time as minister of police, but was banished from the country by the law against the regicides.

Foulke, fohlk, WILLIAM DUDLEY (1848-), an American lawyer, reformer and writer, born in New York City, educated at Columbia University and admitted to the bar in New York in 1870. Six years later he removed to Richmond, Ind., where he practiced successfully until 1890, when he retired from the practice of law. He was elected to the state senate and became a champion of the civil service reform movement in Indiana, as well as an important figure in the national movement. He wrote many articles for the leading periodicals upon his favorite theme, besides valuable studies of contemporary politics.

Founding, the art of casting iron, steel, brass and some other metals into various shapes. The place where castings are made is called the *foundry*. The process of making iron castings practically illustrates that of all other metals. A pattern of the article is first made of wood. This is a little larger than the object, to allow for shrinkage, and is so constructed that it can be taken from the mold in parts, if necessary. The mold is usually a box in two parts. The pattern is set in one part, and molding sand, which is a sand of very fine grain, is tightly packed around it. The other part of the mold is then added, and the process of packing the pattern is completed. When this is done, the mold can be opened and the pattern removed without disturbing the sand, thus leaving a perfect mold of the article to be cast. Holes for pouring in the metal are cut through the sand. The iron is melted in a furnace, called a *cupola*, which is a cylindrical iron furnace, lined with fire brick. It has tuyeres near the bottom, through which the blast enters (See **BLAST FURNACE**). The melted iron is poured into

ladles, from which it is poured directly into the molds. Complicated castings require patterns in several parts and call for great skill in molding. See BELL; BRASS; IRON; STEEL.

Foundling Hos'pitals, institutions for receiving children abandoned by their parents and found by strangers. Among the first of such institutions were those of Paris, instituted in 1670, and London, in 1739. The latter was originally a hospital for all exposed children; but the enormous increase in abandonments caused the hospital to be changed in 1760 to one for poor, illegitimate children, whose mothers are known. In the United States foundling hospitals exist in most large cities, but are carefully regulated by law to prevent abuse of any sort. The death rate in foundling asylums has always been very high, and in many cities a great improvement in this is noticed where the infants can be put out to board in good private families. In Massachusetts, foundling hospitals are prohibited by law.

Fount or Font. See TYPE.

Fountain, a natural spring or stream, or an ornamental basin or tank for receiving water, from which it may be taken for use or may be thrown upward in jets. In the ordinary use of the term its meaning is restricted to artificial fountains. The necessary parts of a fountain are a receptacle for the water and some device for supplying the stream. If the fountain is to be in the form of a jet, the water must flow through a pipe, under pressure. This pressure may be supplied from a head much higher than the fountain or by means of pumps. In fountains that play continuously the pressure is usually supplied by having the source much higher than the fountain, since this reduces the expense of operation.

Fountains are of very ancient date, and both the Greeks and the Romans gave much attention to them, as is shown by the numerous remains of fountains in all ancient Mediterranean countries. The fountains of the Greeks combined ornament and utility, and in some of them the water flowed from the mouth of an animal, usually a lion or a boar, or from the hoofs of the horse Pegasus. The pool or reservoir was usually sunken and was reached by descending a flight of steps. The fountains of the Romans were designed to ornament public parks and squares and at the same time to supply water to those who could not afford to bring it to their dwellings. Modern fountains are patterned after those of the Greeks and Romans and are found

in many cities and towns of Europe and America. Italy, France and Spain are especially noted for the number and beauty of these structures. Among the most famous of those in Europe are the Schöne Brunnen, at Nuremberg, Germany; the Fontana Maggiore, at Perugia, Italy; the Fontaine des Innocents, in Paris, and the fountains and cascades at Versailles and Saint Cloud, in France, and the Alameda Fountain, at Malaga, Spain. Some of the most famous fountains of recent date have been constructed for great expositions. Among these are the *Fountain of the Republic*, by Macmonnies, at the World's Columbian Exposition in Chicago in 1893; the fountains of *Man, Nature and Progress*, at the Pan-American Exposition in Buffalo in 1901, and the *Cascades*, at the Louisiana Purchase Exposition at Saint Louis in 1904.

Electric fountains are constructed to play for only brief periods at a time and are so arranged that a strong electric light can be thrown through the jets. By passing this light through glass of different colors, many variegated and beautiful effects can be produced.

Fountain of Youth. It has been the belief of many people in many times that somewhere there existed a fountain that would bring back youth to the aged. It was the search for this miraculous fountain that brought Ponce de Leon and his followers and possibly other Spanish explorers to America.

Fouque, *foo kay'*, FRIEDRICH HEINRICH KARL, Baron de la Motte (1777-1843), a German poet and novelist. His work is marked by fantastic unreality and extravagance of conception. Several of his tales, *The Enchanted Ring*, *Aslauga's Knight* and, especially, *Undine*, have been very popular.

Fouquet, *foo kay'*, NICOLAS, Vicomte de Melun and de Vaux, Marquis de Belle-Isle (1615-1680), a famous French financier, born in Paris of noble parents. He was educated for the civil service and held important offices under the government, where he attained the favor of Mazarin, then at the height of his political power. In 1653 he became superintendent of finance and immediately instituted reforms in administration which placed the government upon a comparatively firm financial footing. He became a rival of Mazarin and also came into ill favor with Colbert somewhat later. In September, 1661, he was arrested, was held in prison for three years and finally was condemned to banishment with confiscation of all property. His sentence was changed to imprisonment for life. During

fifteen years' captivity he wrote several religious works.

Fourier, *foo rya'*, FRANÇOIS MARIE CHARLES (1772-1837), a French socialist, founder of the system named after him. He entered into business on his own account at Lyons, but lost all his money during the early years of the French Revolution and was forced to enlist in the revolutionary army. Discharged in 1795 on account of ill health, he returned to commerce, filling subordinate situations. He wrote his books in his leisure hours and published them out of his scanty savings.

Fowl, a word originally synonymous with *bird*, now used in a stricter sense to designate a family of birds of which the common domestic fowls, the cock and hen, are familiar examples. The general form and characters of the bill and feet agree with those of the pheasants, but the crown of the head is generally naked and is furnished with a fleshy comb; the base of the lower mandibles also bears fleshy lobes, or wattles, which are most conspicuous in the males. The legs of the male are furnished with spurs, which are much used in conflict, the cocks being particularly quarrelsome and unable to suffer the presence of a rival. In the center of the cock's tail are two long feathers, which fall backward in a graceful arch and add great beauty to the whole aspect of the fowl. Except in the pure white breeds, the plumage of the cock is always more splendid than that of the hen. All the species are natives of the East Indies and the Malay Archipelago. See POULTRY.

Fox, an animal closely related to the dog. It is a native of almost every part of the globe and



RED FOX

is everywhere known as the most wily of beasts of prey. It has a straight, bushy tail, erect ears and is extremely alert and avaricious, devouring birds and small quadrupeds, fruits, honey and eggs. The stories told of the animal's intelligence in eluding its enemies, in protecting its

young and in getting its food are often too wonderful to be easily believed. The fox's home is a dry burrow or hole in the rock, and usually consists of an outer hole, or room, where the fox lies, a store room, where he keeps his food, and behind all, his sleeping room and the place where his family lives. When the fox is captured he will sometimes feign death and will endure the roughest treatment without flinching.

Besides the common fox of Europe and Asia, there are the *blue fox* of the Aleutian and other Arctic islands, notable for its beautiful bluish fur, one of the most valuable furs in the market; the *black fox*, a native of the northern parts of Asia and America, similar to the common fox, but distinguishable by its rich, shiny, black fur; the *gray fox*, common through the northern parts of America, characterized by the thick tail, at the tip of which is a tuft of stiff hairs; the *red fox*, of America, generally of a pale yellow color, but in the winter almost pure white, especially in the Arctic regions; the *crossed fox*, whose fur is gray on the upper parts and black beneath and on the muzzle, with a dark cross over the shoulders, and the *swift fox*, an inhabitant of the western American plain. In England, fox-hunting is one of the greatest of sports, and large packs of hounds and many fine horses are trained for the hunt. The fox will dodge, double on his track, try to conceal his scent and use many other ingenious tricks to deceive his pursuers. This sport is not regarded with favor in America, because it is considered excessively cruel and because land owners object to opening their fields for such sports.

Fox or **Muskwaki**, a tribe of indians belonging to the Algonquian family, now few in numbers and scattered over Oklahoma, Iowa, Kansas and Nebraska. See SAC.

Fox, CHARLES JAMES (1749-1806), an eminent English statesman and orator. From his first election to Parliament in 1768 he was recognized as a man of promise. He was a member of North's ministry from 1770 to 1773 and of Rockingham's in 1782. He was a close friend of Burke and was one of the chief opponents of the war with America, the outcome of which he clearly foresaw. As an admirer of Napoleon and an opponent of the war with France, Fox was the great rival of Pitt. Among orators, Fox was of the first class, although in eloquence and brilliancy he did not perhaps equal Pitt, Burke and Sheridan. His private life was marred by vices, but these he never allowed to interfere with the performance of his public duties.

Fox, GEORGE (1624-1691), the founder of the Society of Friends, or Quakers, was born at Drayton, in Leicestershire. He was apprenticed to a shoemaker, but he soon began to wander from place to place, preaching and otherwise laboring for religious reforms. He declared that the source of divine truth was not the Scriptures, but the Spirit of God; for these words he was frequently imprisoned, but still he gained many followers. He traveled in the West Indies and on the continent of Europe and won many converts. His followers were first denominated *Quakers* in consequence of their trembling mode of delivery and their calls on the magistracy to tremble before the Lord.

Fox Bat, the name of the largest of the bat family, sometimes attaining a length of from four to five feet. It is a fruit-eating bat, found in Japan, China, Australia, Java, Sumatra, Borneo and parts of Africa. Fox bats receive their name because of the resemblance of their muzzles to those of the fox. They are also called *flying foxes*. They have soft, woolly fur, of a reddish color. The natives consider this bat a good article of food, but it often does serious damage to their fruit plantations. The fox bat is nocturnal in its habits.

Foxe, JOHN (1516-1587), an English Church historian. His principal work is the *History of the Acts and Monuments of the Church*, commonly called *Foxe's Book of Martyrs*, which has gone through innumerable editions.

Fox'glove, a plant which grows on banks and in pastures, in hilly and rocky countries in Europe, Asia and the Canary Islands. It is stately and beautiful and has a great reputation

purple, or sometimes white, tubular flowers are large and showy and are arranged in a long, loose spike at the end of the stem.

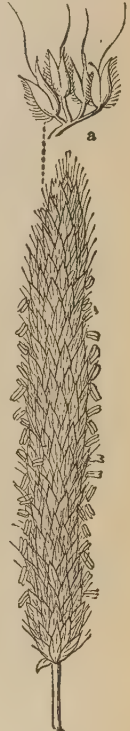
Fox'hound, a high-spirited hound that has a keen scent, remarkable perseverance and great endurance. It is easily trained and becomes very skilful in hunting foxes. Somewhat smaller than the staghound, the foxhound seems to be a cross between the staghound or the bloodhound and the greyhound. It is commonly of a white color, with patches of black and tan, has short hair, large and straight limbs and large, thin ears. Its usual height is about twenty inches.

Fox River, a river of Wisconsin, which enters Green Bay, an arm of Lake Michigan, after passing through Lake Winnebago. It is connected by canal with the Mississippi and thus furnishes water communication between that river and the Atlantic. Its length is about 250 miles.

Fox Spar'row, a rusty red sparrow with a whitish breast, marked with rust-red. This bird, which is one of the largest and handsomest of the sparrows, appears in the Northern states during the spring migrations. It has a beautiful song, much like that of the thrush.

Fox'tail Grass, the common name given to certain grasses, because of the shape of the large clusters in which the flowers are arranged. It is an abundant natural grass in meadows and pastures and is an excellent fodder plant. Other species, however, are dry and harsh, not only valueless, but sometimes troublesome weeds, especially in clover fields.

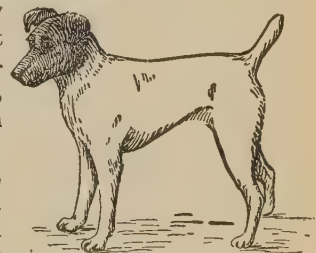
Fox Terrier, a small dog with long, flat and rather narrow head, strong jaws and small V-shaped ears. The nose is black, the eyes small and the body strong. The color is usually white, with black or tan markings. The fox terrier was formerly used to drive foxes



FOXTAIL GRASS
a, spikelet in bloom.



FOXHOUND



FOX TERRIER

as a medicinal plant. Digitalis, as the drug prepared from the foxglove is known, is a bitter substance that has power over the action of the heart and may prove fatal in large doses. The

from their holes, but is now regarded chiefly as a pet.

Foyle, a river of Ireland, which flows north-east through Tyrone, Donegal and Londonderry, till it falls into Lough Foyle, 4 miles below the city of Londonderry.

Fraction, in arithmetic and algebra, one or more of several equal parts into which a whole number is divided; also the written expression of this quantity. A written fraction has two terms, the *denominator*, which tells the number of parts into which the whole number is divided, and the *numerator*, which indicates the number of those parts that are considered. When the denominator is greater than the numerator the fraction is *proper*; when less, it is *improper* and then always represents more than one. When denominator and numerator are equal, the fraction represents *unity*, or one. Fractions are of two classes, *common*, or *vulgar*, and *decimal*. In the former the denominator is written below the numerator, from which it is separated by a line, as, $\frac{3}{4}$. In the latter, the denominator always equals 10 or a power of 10. It may be written below the numerator or in a shorter form, as, .01 (equals $\frac{1}{100}$), the denominator being determined by the position of the numerator in relation to a fixed point, called the decimal point. Fractions can be added and subtracted when they are *similar*, that is, when their denominators are the same, by adding the numerators. They can be made similar by finding the least common multiple of their denominators and multiplying each numerator by the quotient resulting from the division of the new denominator by the old. Common fractions can be multiplied by multiplying the numerators together and the denominators together, the product of the numerators becoming the numerator of a new fraction and the product of the denominators becoming the denominator. In dividing one common fraction by another, the divisor is inverted and the process is completed as in multiplication. One decimal fraction may be multiplied by another in the same manner as whole numbers, but in the product a decimal point is placed as many places to the left of the right-hand figure as the sum of the decimal places in the multiplicand and the multiplier. A decimal fraction may be divided by another in the same manner as in the division of whole numbers, the decimal point in the quotient being placed as many places to the right of the right-hand figure as the difference between the decimal places in the dividend and the divisor. A com-

plex fraction is one in which the numerator or denominator contains a fraction. In algebra, fractions are subject to the same principles and operations as in arithmetic, the disposition of signs being the only added element.

Fra Diavolo, *frah de ah'vo lo*, (Italian, "brother devil") (1770?-1806), a famous Italian brigand, born in Calabria. His real name was Michele Pezza. He was originally a monk. Collecting a band of outlaws, he retired to the mountains, where he attacked and robbed travelers, treating them with the greatest cruelty. He assisted Ferdinand of Naples against the French, but was afterwards detected in fomenting rebellion and was seized and executed. Auber's opera *Fra Diavolo* is founded upon the traditions connected with the name of Pezza, but it has little true historical setting. See BRIGANDAGE.

Fra'mingham, MASS., a town in Middlesex co., 20 mi. w. of Boston, on the Sudbury River and on the New York, New Haven & Hartford railroad. A state normal school is located here, and the town has a public library, an almshouse, a hospital and a home for the aged. There are manufactures of boots, shoes, chairs and rubber, woolen and other goods. It was settled about 1647 and was known as Danforth's Plantation until its incorporation in 1700. Population in 1910, 12,948. (

Franc, a modern silver coin and money of account, which since 1795 has formed the unit of the French monetary system and has also been adopted as the unit of coinage by Switzerland and Belgium. Its value is a little over 19 cents in United States money and about 9½ pence in English money. It is divided into 10 *decimes* and 100 *centimes*. One of the most common coins in France is the *sou*, equivalent to 5 centimes. Other coins are the 2-franc, 5-franc, 20-centime and 50-centime pieces, in silver, and the 5-franc, 10-franc, 20-franc (the Napoleon), 50-franc and 100-franc pieces, in gold.

France, *frans*, a country in the southwestern part of Europe, extending from latitude 42° 20' to 51° 5' n. and from longitude 4° 48' w. to 8° 11' e. It is bounded on the n. e. by Belgium, on the e. by Germany, Switzerland and Italy, on the s. by the Mediterranean Sea and Spain, on the w. by the Bay of Biscay and Atlantic Ocean and on the n. w. by the English Channel and the Strait of Dover. The important coast waters are the Gulf of Lyons and the Bay of Biscay. The greatest length from north to south is 600 miles, and from east to west, 550 miles. The longest distance through the coun-

try is on a line extending diagonally from Brest to the southeastern corner, 680 miles. The area, exclusive of islands, is 207,054 sq. mi., or about $1\frac{3}{8}$ the area of Texas. The coast line is very even and is about 2000 miles in extent.

SURFACE AND DRAINAGE. The larger part of the country is comparatively low and level. The highest lands are in the south and southeast. The Pyrenees form an unbroken boundary between France and Spain and have an average height of about 9000 feet, but the highest peaks reach an altitude of nearly 10,500 feet. The eastern boundary of the country is formed by the Alps in the south, the Jura Mountains in the center and the Vosges Mountains in the north. The Alps attain their highest altitudes in this boundary line, where Mont Blanc, which is nearly all in France, reaches a height of 15,780 feet. Other important peaks on this range are Mont Cenis, to the south, noted for its celebrated pass, and later for the railway tunnel which forms connection with Italy; Mont Genevre, and Mont Viso. All of these are of sufficient altitude to give them prominence in a range of mountains noted for the grandeur of its scenery. West of the Alps and running almost parallel to them are the Cevennes, a range of low mountains which extends almost from the southern to the northern boundary and forms the great watershed separating the valleys of the Rhine and Rhone from the rivers which flow into the Bay of Biscay and the English Channel. In the south central portion of the country are the Mountains of Auvergne, a series of low volcanic peaks, situated upon the central plateau. All of the northern and western portion of the country is a part of the great Asiatic plain, which finds its western terminus here and in the southern part of Great Britain. The general slope of this plain is to the north and west, and it occupies fully four-fifths of the entire country. The spurs thrown off by the great watershed divide France into seven principal river basins, six of which are on the northwestern slope and one on the southeastern. These are (1) the basin of the Garonne and its affluents; (2) the basin of the Loire and its tributaries, the Nièvre and Maine on the right, the Allier, Loiret, Cher, Indre, Vienne and Sèvre Nantaise on the left; (3) the basin of the Seine and its tributaries, the Aude, Marne and Oise on the right, the Yonne and Eure on the left; (4) the basin of the Meuse, with its affluent, the Sambre; (5) the basin of the Escaut, or Scheldt, with its affluent, the Scarpe; (6) the basin which pours a number

of tributaries, the principal of which is the Moselle, into the Rhine; (7) the basin of the Rhone, occupying the whole of the territory which lies to the southeast of the great watershed, the tributaries being the Ain, Saône, Ardèche and Gard on the right, and the Isère, Drôme and Durance on the left. The four great rivers of France are the Loire, the Seine, the Rhone and the Garonne. France has in all more than 200 navigable streams, with a total navigation of about 5500 miles. Lakes are few and small.

CLIMATE. The climate of France is characterized by its mild and even temperature throughout all of the lowland region, and by its continental features in the mountainous regions of the interior. In general along the coast the climate is remarkably warm and even for the latitude. This is due largely to the warm winds blowing over the Atlantic, which prevail during the greater part of the year. The high altitudes in the mountainous regions are cooler, and in the Alpine region the climate exhibits a marked contrast between winter and summer, the winters being cold and the summers hot. The southeastern section, bordering on the Mediterranean, has a semi-tropical climate, and here the olive, the orange and other semi-tropical fruits and plants flourish. The prevailing winds over this portion come from the Mediterranean, and it is due to this fact that this section maintains its high and even temperature. The rainfall varies considerably in different parts of the country. In the mountainous regions of the Pyrenees, the Cevennes and the Alps it usually exceeds 40 inches. Throughout the country as a whole the average is about 30 inches. With the exception of a small area in the northern plains, where the annual rainfall is only about 10 inches, there is everywhere an abundance of moisture for agricultural purposes.

MINERAL RESOURCES. Coal fields are numerous, but only two are really of importance, that of Valenciennes, in the northeast, forming the western extremity of the great Belgian coal field, and that of Saint Etienne, in the southeast, to which the manufactures of Lyons and the surrounding districts are indebted for much of their prosperity. However, the annual output falls so far short of the annual consumption that a large import takes place from England and Belgium, particularly the latter, and wood continues to be the common fuel throughout France, at least for domestic purposes. The coal fields contain seams of iron, which are extensively worked and which furnish ore to a

great number of blast furnaces; but of the total amount of ore smelted in the country a considerable proportion is imported. Other metals, such as lead, zinc, manganese and copper, are obtained to some extent. Common salt is obtained from mines of rock salt, from salt springs and in still greater quantity from lagoons and salt marshes on the coast. Marble is quarried in the Alps and Pyrenees, granite and other building stone is found in many localities and roofing slate is obtained in large quantities.

FISHERIES. The fisheries of France are extensive. The principal fishes of commercial importance are sardines, found on the coast of the Bay of Biscay; herring, mackerel, turbot and salmon, abundant in the English Channel and the North Sea; tunnies and anchovies, found on the shores of the Mediterranean. Oyster breeding is largely engaged in, the most extensive oyster beds being those of the basin of Arcachon, in the Department of the Gironde. Cod fishing is carried on actively near the Newfoundland banks by French fishermen, and also near Iceland.

AGRICULTURE. About nine-tenths of the soil of France is productive, and about one-half of the whole is under the plow. The cereals forming the great bulk of the cultivated crops are wheat, oats, rye and barley. Wheat is the most important cereal, and, next to Russia, France raises the largest quantity of all European countries. The crops next in importance to these are meslin, or mixed corn, potatoes, hemp, rape, maize, buckwheat, flax and beets. Beets are cultivated extensively in some departments, especially in that of Nord, for the manufacture of sugar. The cultivation of tobacco is monopolized by the government and is confined to certain departments. In France grass land is not abundant and the breeding of cattle is indifferently practiced. The rearing of sheep is more successful, much of the wool being scarcely inferior to merino wool. Excellent horses are bred in the north, and as there is an extensive demand for horses for the army, considerable pains is taken in the government studs to improve the breeds. Asses and mules, generally of a superior description, are much employed. The cultivation of the vine is one of the most important branches of French agriculture, the total quantity of land in vineyards being nearly a twenty-fifth of the whole surface. In everything relating to this branch of culture, the French are unsurpassed, the various first-class wines which they produce, under the names of Champagne,

Burgundy and Bordeaux, being universally known. It is estimated that in good years France produces about one-half of the wine of the world. Among the most important fruit trees cultivated in France are the apple, especially in Normandy; the chestnut, whose nuts in some of the central districts of France form a staple of food among the poorer classes; the mulberry tree, cultivated in the southeast, both for its fruit and its leaves, the latter furnishing the food of the silkworms so largely reared here (See SILK); the olive, the pear, the plum, the peach, the orange, the citron and the fig. The land is divided into small farms, the largest seldom exceeding fifteen acres. Most of these farms are owned by those who occupy them. Intensive farming is practiced; the utmost skill and latest scientific methods are employed in cultivating the soil, and excellent returns reward the husbandmen.

MANUFACTURES. France is the fourth manufacturing country of the world. The most important of the textile manufactures is that of silk goods, having its chief seat at Lyons and the surrounding districts. It employs about two millions of persons and furnishes more than one-fourth in value of the whole of the manufactured products of France. After silk goods, though at a considerable distance, follow cotton stuffs and woolens, made largely at Rheims, Amiens and Beauvais; carpets, at Abbeville; tapestry, at Paris and Beauvais; linens, including fine muslin, gauze and lace, at Saint Quentin; cutlery, porcelain, stoneware and common pottery, beet sugar, leather, paper, hats, hosiery, steel, iron, brass and zinc ware, plate and flint glass, besides many ornamental and artistic articles; jewelry, clocks, surgical instruments, types, engravings, buttons, gloves, ribbons and numerous other small articles.

TRANSPORTATION. The canals are numerous. The Canal du Midi, or, as it is sometimes called, the Canal of Languedoc, starting from a point in the Garonne a little below Toulouse, extends to the lagoon of Thau and thereby gives a continuous navigable communication between the Atlantic and the Mediterranean, in the line of the important towns of Bordeaux, Agen, Toulouse, Carcassonne and Narbonne. In like manner three separate canals cut across the basin of the Rhone, the Canal du Centre, or of Charolais, connecting the Saône and the Loire; the Rhone and Rhine Canal, so called because it unites these rivers, partly by the intervention of the Doubs; and the Canal of Bourgogne, connecting

France

the Saône, the Yonne and the Seine. In all, France possesses about 3000 miles of canals, in addition to about 5500 miles of navigable rivers, giving a total equal to about one mile of internal navigation for every twenty-four square miles of surface. The railways in France partly belong to the State and partly have been granted to private companies for a limited period, at the end of which they become State property. In 1912 there were 31,391 miles of railway in operation, besides 5600 miles of tramway. Paris is the great railway center, and lines radiate from it in all directions. These, with cross lines, give all important towns railway communication. There were also 114,400 miles of telegraph lines.

COMMERCE. The foreign trade amounted in 1911 to about \$2,860,000,000. The exports are slightly less than the imports, which consist of food products, raw materials for manufactures and coal, while the exports consist of wine, dairy products, raw silk and manufactured goods, in which textiles, gloves, millinery and small wares are important. The foreign trade is carried on principally with Great Britain, Belgium, the United States and Germany, the countries being named in the order of their importance.

INHABITANTS AND LANGUAGE. The French people are the result of the intermingling of numerous races, some of which came from the North and belonged to the Teutonic branch of the human family, while others came from the South and belonged to the Latin branch. The inhabitants of the northwestern part of France exhibit strong Teutonic characteristics. They are tall of stature and have light hair and light complexion, while those of the southern and southwestern portion of the country exhibit equally strong Latin traits. They are usually short of stature, have dark hair and eyes and dark skins. There is no marked line of separation between these two classes, since through intermarriage types having characteristics between the two are frequently formed. The French language prevails throughout the country, but in the north, especially in the departments bordering on Belgium, Flemish is spoken to some extent, while in the south-east Italian is quite common. See FRENCH LANGUAGE.

EDUCATION. The country has a complete system of education, extending from the kindergarten to the highest university. For a full description, see EDUCATION, NATIONAL SYSTEMS OF, subhead *France*.

France

LITERATURE AND ART. See LITERATURE, subhead *French Literature*; PAINTING; SCULPTURE, subhead *France*; ARCHITECTURE.

COLONIES. The colonial possessions of France far exceed in area and population the home country and are distributed as shown by the following table:

FRANCE'S COLONIAL POSSESSIONS	AREA* IN ENGLISH MILES	ESTIMATED POPULATION
IN ASIA:		
India.....	196	277,000
Annam.....	52,100	6,000,000
Cambodia.....	37,400	1,500,000
Cochin-China.....	22,000	2,968,600
Tonkin and Laos.....	144,400	6,500,000
IN AFRICA:		
Algeria.....	184,474	5,563,000
Tunis.....	51,000	2,000,000
Western Sahara.....	1,544,000	2,550,000
Senegal.....	806,000	4,523,000
Senegambia and Niger.....	210,000	3,000,000
French Guinea.....	95,000	2,200,000
Ivory Coast.....	116,000	1,000,000
Dahomey.....	60,000	1,000,000
Kongo.....	450,000	10,000,000
Somali Coast and Dependencies.....	12,000	200,000
Réunion.....	966	201,000
Comoro Isles.....	760	90,000
Madagascar and Islands.....	227,950	3,054,650
IN AMERICA:		
Guiana.....	30,500	49,009
Guadeloupe and Dependencies.....	688	190,273
Martinique.....	380	182,024
St. Pierre and Miquelon.....	92	4,768
IN OCEANIA:		
New Caledonia and Dependencies.....	7,650	55,886
Establishments in Oceania.....	1,520	30,560
Total.....	4,055,076*	53,139,761

*The areas of many of these territories, especially those in Africa, are still in doubt, owing to the fact that the boundaries have never been definitely established. The total area given in this table is in accord with the best authorities.

GOVERNMENT AND RELIGION. The government is republican in form. The chief executive is a president, elected by the two houses of the national legislature for a term of seven years. The legislative department consists of the Chamber of Deputies and the Senate. The Chamber comprises members elected by universal suffrage for four years, and apportioned among the arrondissements. The Senate is composed of 300 members, chosen by direct election for nine years. The colonies are represented in the chambers. The president is assisted by a ministry, the members of which preside over the several departments of government.

For the purpose of local administration the country is divided into 84 departments. Each department is governed by a prefect, who is appointed by the president and is assisted by a council composed of a number of members equal

to the number of cantons. Each department is subdivided into arrondissements, there being four to a department. The arrondissement is again subdivided into eight cantons, and the cantons are subdivided into communes, the commune being the smallest unit for local government. Each commune comprises a town or a part of a town or one or more villages and is governed by a mayor, who is appointed by the government, and a municipal council, which is elected by the inhabitants. The peculiarity of the French government lies in the direct connection of the national government with all local government. Through appointments every officer is practically responsible to the heads of departments, and through them to the president.

The judicial system embraces a series of courts, at the head of which is the court of cassation at Paris, consisting of a president, three presidents of sections and 45 judges, or counselors. Below this are 26 courts of appeal, each having jurisdiction over several departments. These courts are engaged entirely with cases appealed from the courts in the arrondissements, known as courts of first instance, and below these are the justice courts of the cantons and communes.

By far the larger part of the inhabitants profess the Roman Catholic faith, and until recently there was a close connection between Church and State, but in 1906 this was completely dissolved. All religious beliefs have equal standing before the government, and all beliefs are tolerated.

ARMY AND NAVY. See ARMY, subhead *French Army*; NAVY, subhead *French Navy*.

CITIES. France has a number of important cities. At the head of these stands Paris, the political and commercial capital of the country and the largest city on the Continent. The other large cities, in the order of their importance, are Marseilles, Lyons, Bordeaux, Lille, Toulouse, Saint-Etienne, Roubaix, Nantes and Havre. Each of these is described under its title.

HISTORY. France, or Gaul, as it was called by the Romans, was inhabited during the earliest years in which we have any knowledge of it by a number of independent tribes, who appear to have been mainly Celtic in race. In the latter half of the seventh century B. C., the Romans conquered a portion of the southeast, and under Julius Caesar the conquest of all Gaul was completed, between 58 and 51 B. C. During the Roman occupation, the country became completely Romanized in language, civilization and religion, and many flourishing towns sprang up; but in the decline of the Roman Empire various

German tribes began to make settlements in the country, especially the Visigoths, the Burgundians and the Franks. It is from these last that the country took its name. Toward the close of the fifth century, Clovis, chief of the Salian Franks, completely overthrew Roman dominion and made himself master, not only of almost all France, but of considerable territory east of the Rhine. The dynasty which he founded is known as the Merovingian. On the death of Clovis, in 511, his kingdom was divided among his four sons, and a large part of the history of the Franks under the Merovingian kings is the history of the contests between Neustria and Austrasia, the two most important of the states into which the Empire was divided. Pippin of Heristal, mayor of the palace of the Austrasian king, conquered Neustria and thus brought all France under the same sway. He was the real ruler, although there was still a nominal king, as there was during the time of Pippin's son, Charles Martel. Pippin the Short, first mayor of the palace under the last of the Merovingian kings, was himself raised to the throne in 751. He was succeeded in his kingdom by his son, Charles the Great (See CHARLEMAGNE). Charlemagne's great empire was a German one, however, and there was as yet, strictly speaking, no kingdom of France.

On the death of Charlemagne's son, Louis the Pious, the empire was divided by the Treaty of Verdun (843) among his sons, Charles the Bald receiving that part which most nearly corresponds to modern France. It is at this time, therefore, that the separate history of France may be said to begin.

Charles the Fat, king of Germany, succeeded in 884 in making himself ruler of the Frankish territory also, but he was deposed after three years. After the brief usurpation of Odo, count of Paris, Charles III, the brother of Louis III, was recognized as king. His authority was little more than nominal, as France was divided into a number of great fiefs, the holders of which were practically independent. This circumstance made it impossible for Charles to offer any adequate resistance to the Norman pirates, whom he was obliged to buy off by surrendering to them the territory which took from them the name of Normandy. On the death of Louis V, in 987, Hugh Capet, the son of the most powerful of the great vassals, was raised to the throne, thus becoming the founder of the Capetian dynasty. The fact that the accession of the House of Capet added to the Crown the great

fiefs of Paris and Orleans made the central authority somewhat stronger than it had been under the Carolingian kings.

The first great task of the Capetian line was to reconquer the royal prerogatives from the great vassals, but for two centuries they were unsuccessful (See CAPETIAN DYNASTY). Louis the Fat, who came to the throne in 1108, was the first really strong ruler of the line. In his struggle with the nobles he was greatly helped by the fact that the latter had been much weakened by the Crusades and also by the increased power of the towns, who allied themselves with the king. (For the chief events under the later Capetian kings, see PHILIP II, AUGUSTUS; LOUIS IX; PHILIP IV.)

With the death of Charles IV, in 1328, the first branch of the Capetian kings became extinct, and Philip, of the House of Valois, a cousin of Charles IV, came to the throne, according to the Salic Law. The claim of Edward III of England to the throne of France led to a series of wars between the two countries, which lasted for over one hundred years (See HUNDRED YEARS' WAR; JOAN OF ARC; DU GUESCLIN, BERTRAND; CHARLES VI of France; HENRY V of England; CHARLES VII). Under Charles VII, France regained from England all of the territory of France, except Calais. The shrewdness and unscrupulousness of Louis XI (1461-1483) completed the subjugation of the great barons and laid the foundation of absolute monarchy (See LOUIS XI). Maine, Anjou and Provence were left to him by the will of the last count, and a large part of the possessions of the duke of Burgundy came to his hands shortly after the death of Charles the Bold of Burgundy. Louis's son and successor, Charles VIII (1483-1498), united Brittany to the Crown by his marriage with Anne of Brittany. During the reign of Charles VIII occurred the first invasion of Italy by France, which had such important results.

Charles was the last king of the direct line of Valois and was succeeded by Louis XII, of the House of Valois-Orleans. On his death the crown passed to another branch of the House of Valois, the Valois-Angoulême branch, in the person of Francis I (1515-1547). Francis continued the attempts at conquest in Italy and thus came into conflict with Charles V of Germany, who claimed Milan. The results were disastrous for Francis (See FRANCIS I). On the death of Francis, his son, Henry II (1547-1559), came to the throne, and he continued the struggle

with Austria. His reign is noteworthy, because during it began the persecution of the Huguenots. Francis II, the husband of Mary Queen of Scots, succeeded his father, Henry, but reigned little more than a year (1559-1560). During his reign and the reigns of his brothers, Charles IX and Henry III, intrigue and corruption gave to women a dangerous influence at court and in public affairs. During the reign of Charles IX, who was entirely under the influence of his mother, Catharine de' Medici, the struggle between Huguenots and Catholics came to a climax in the Massacre of Saint Bartholomew's Day (See BARTHOLOMEW'S DAY, SAINT; HOLY LEAGUE). These religious wars were terminated only when Henry IV of Navarre (1589-1610), the leader of the Huguenots, who became king of France on the death of Henry III, went over to the Catholic Church (See HENRY IV).

During the minority of Henry's son, Louis XIII, the policy of France was somewhat wavering, until the prime minister, Richelieu, gave it a steady direction (See RICHELIEU, ARMAND JEAN DUPLESSIS). He continued the policy of the former kings who had labored for the humiliation of Austria and relentlessly oppressed the Huguenots. Louis XIII died in 1643, the year after Richelieu, and was succeeded by his son, Louis XIV. Mazarin, during the years of Louis's minority, carried out the policy of Richelieu, and Louis XIV, when he took the rule into his own hand, proved to be a ruler of strong will and steady purpose (See LOUIS XIV). The close of this reign in 1715 found the finances in disorder, an enormous national debt imposed upon the country and industries in a depressed condition. Louis XV, the great-grandson of Louis XIV, succeeded him at the age of five years. During his minority, the regent, the duke of Orleans, squandered the revenues in a most reckless manner, and when Louis himself assumed the authority matters grew worse, rather than better, for he was constantly under the influence of mistresses, by whom he was led into useless and costly wars (See SUCCESSION WARS; SEVEN YEARS' WAR).

With the reign of Louis XVI began the period of reaction against the oppression which had been practiced on the people. The king himself was honest and well-meaning, but the whole administration was rotten, and the court, the nobility and the clergy formed a privileged class, united to oppress the people. The taxation, which was necessarily heavy, fell upon the peasantry only, leaving the two leisure classes

untouched. The good intentions of Louis were neutralized by a total lack of energy and firmness, and he was unable to appreciate the fact that his few concessions could not materially improve a situation which called for the most thorough-going reforms. The great difficulty of his government was the hopeless condition of the public finances, with which Turgot, Necker, Calonne and Brienne in vain attempted to grapple. Finding all ordinary measures unavailing, Necker called for the congregation of the States-General, which had not met since 1614. This body met in May, 1789. (For an account of the ten years which followed this date, see FRENCH REVOLUTION, THE.) In 1799 Napoleon was made first consul, and for the next sixteen years the history of France is virtually the history of Napoleon (See NAPOLEON I.).

Louis XVIII, who was placed on the throne of France on Napoleon's first abdication in 1814 and was restored in 1815 after the Hundred Days, at first governed with the support of a moderate liberal party. The reactionary spirit of the aristocrats and returned *émigrés* soon, however, came to predominate. Louis died in 1824 and his brother Charles succeeded him. The oppressive policies of the former reign were still more prominent under the new ruler, and finally, in 1830, the ministry published ordinances suppressing the liberty of the press and creating a new system of elections. The result was the insurrection of July, 1830, by which Charles X was overthrown and Louis Philippe, duke of Orleans, was proclaimed king (See LOUIS PHILIPPE). The new administration proved popular with no party, and in February, 1848, another revolution drove Louis Philippe into exile. A republic was proclaimed, and in December, 1848, Louis Napoleon, nephew of the great Napoleon, was elected president for four years. Three years later he established himself as president for a further term of ten years, and in 1852 he was able to have himself declared emperor, under the title of Napoleon III. When the votes of the people were taken, his seizure of the power was confirmed by over seven million votes (See NAPOLEON III.).

In 1870 the uneasiness of Napoleon and the French at the steady growth of Prussian power reached a climax when the Spanish crown was offered to a prince of the House of Hohenzollern. The result of the behavior of France was the Franco-German War (See FRANCO-GERMAN WAR), which ended in the complete defeat of the French and the capture of Paris by the German

armies. Immediately on the receipt of the news of the defeat at Sedan, a republic was proclaimed in Paris, and a period of civil war followed (See COMMUNE). Thiers, the first president, resigned in 1873, and Marshal MacMahon was put in his place. In 1875 a constitution was drawn up which provided for a legislative body to consist of two chambers. By 1879, at the resignation of MacMahon, the government of France had been considerably strengthened. Jules Grévy succeeded MacMahon and was reelected in 1885, but resigned two years later. He was succeeded by Sadi Carnot, during whose administration a serious attempt was made under General Boulanger to overthrow the republic. Three parties, the Orléanists, the Bonapartists and the Radicals, were interested in this movement, and as Boulanger was very popular throughout the country, it seemed as if matters might end disastrously for the government; but the popularity of the leader waned, and he was finally obliged to flee from the country. A great sensation was also created during Carnot's administration by the failure of the Panama Canal scheme, which led to the prosecution of a number of noted men (See PANAMA CANAL). Carnot was assassinated in 1894 and was succeeded by Casimir-Périer, who resigned in less than a year. His successor was Félix Faure, who was succeeded by Emile Loubet. In 1906 Loubet was succeeded by Clément Armand Fallières, who in 1913 was succeeded by Poincaré. In 1914 France became involved in the general European war, brought on by the murder of Archduke Franz Ferdinand of Austria. See WAR OF THE NATIONS; AUSTRIA-HUNGARY, subhead *History*. Population in 1911, 39,601,509.

France, ANATOLE (1844-), a French critic, novelist and humorist whose real name is Jacques Anatole Thibault. *The Crime of Sylvestre Bonnard*, which has been several times translated into English, was published in 1881 and first won him fame. Among his other works are *Opinions of the Abbe Jerome Coignard*, *The Garden of Epicurus*, *Thais*, *The Red Lily* and *Isle of Penguins*. France was made a member of the French Academy in 1896.

Franchise *fran'chize*, in a general and legal sense, a particular privilege or right, granted by a government to an individual, association or corporation; as, a *franchise* to construct and operate street railways. The name is especially given to the right to vote.

Francia, *fran'cha* (1450-1518), whose real name was Francesco di Marco Raibolini, a

famous Italian painter, engraver, medalist and goldsmith, was born at Bologna. He excelled particularly in painting Madonnas and executed a number of admirable frescoes in the Church of Saint Cecilia at Bologna, but his most famous work is an altar piece in the Church of Saint Giacomo Maggiore in the same city. Though his pictures are charming, they lack dramatic action, but this fault was slightly remedied in his later works, owing to the influence of Raphael.

Fran'cis I (1494-1547), king of France, ascended the throne in 1515, on the death of his father-in-law, Louis XII. In prosecution of his claim to Milan, he defeated the Swiss in the plains of Marignano and forced the reigning duke, Maximilian Sforza, to relinquish the sovereignty. On the death of the emperor Maximilian, in 1519, Francis was one of the competitors for the rank of emperor; but the choice fell on Charles of Austria, the grandson of Maximilian, henceforth known as Emperor Charles V. From this period Francis and Charles were rivals, and were almost continually at war with each other. Francis was at first severely defeated, and though later, with the aid of the Turks, he won victories, they brought no permanent advantage to France.

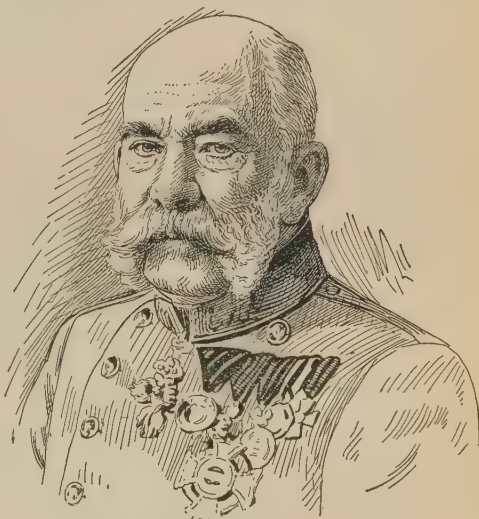
Francis I (1708-1765), Holy Roman emperor. In 1736 he married Maria Theresa, daughter of the emperor Charles VI, and after the death of Charles VI (1740) he was declared by his wife co-regent of all the hereditary states of Austria, but without being permitted to take any part in the administration. He was elected emperor in 1745.

Francis II (1768-1835), Holy Roman emperor and emperor of Austria, succeeded his father in 1792. France declared war against him in 1792, and hostilities continued till the Peace of Campo Formio in 1797. In 1799 he entered into a new coalition with England and Russia against the French Republic, but the result of the battles of Marengo and Hohenlinden was far from favorable to Austria. In 1804 Francis assumed the title of hereditary emperor of Austria, and in the following year, after the Battle of Austerlitz, he was forced to give up his title of Holy Roman emperor. In 1809 he again took up arms against France, and in the Peace of Vienna was compelled to surrender much territory. After the overthrow of Napoleon, Francis became a member of the reactionary Holy Alliance, under the guidance of his minister, Metternich.

Francis'cans, the members of the religious order established by Saint Francis of Assisi about

1210. They are also called Minorites, or *Fratres Minores*, which was the name given them by their founder in token of humility, and sometimes Gray Friars, from the color of their garment. The order was distinguished by vows of absolute poverty and a renunciation of the pleasures of the world and was intended to serve the Church by its care of the religious state of the people.

Francis Joseph I (1830-), emperor of Austria, king of Bohemia and Hungary, succeeded his uncle, Ferdinand I, a mental and physical weakling who found himself unable to cope with the political disturbances of 1848 and on December 20 of that year abdicated in favor of his nephew. The Hungarians, in revolt, under the leadership of Kossuth, refused to recognize the new emperor, on the ground that the abdication could be valid only with the consent of the Hungarian parliament.



FRANCIS JOSEPH I

This revolt and another uprising in Sardinia were quickly crushed. For the next four years the emperor was almost completely dominated by his ministers, but in 1852 the personal rule of the emperor really began. Except on rare occasions Francis Joseph was thereafter the real ruler of his empire. He not only appointed ministers but controlled their policy. Owing to his great knowledge of affairs and his unending diligence and capacity for work, he had a real control even over the details of government. Early in his reign his policy was conservative—almost reactionary—but in later years he showed a broader view of affairs and a willingness to

grant necessary reforms. After the disastrous war with France and Sardinia in 1859 and the Seven Weeks' War with Prussia in 1866, Francis Joseph saw the need of liberal action, and in 1867 the relations of Austria and Hungary were adjusted by the grant of a constitution to Hungary.

In 1883 Francis Joseph became a party to the Triple Alliance, though Germany and Italy were nations built on the ruins of Hapsburg ambitions. In his foreign policy he was an advocate of European peace, though he seemed not unwilling to break it for the glory of Austria. In 1908, contrary to the Treaty of Berlin, he proclaimed the annexation of Bosnia and Herzegovina to Austria-Hungary.

In private life the emperor was the victim of many catastrophes—his wife, his brother, his only son and his nephew having met violent deaths. His brother, Emperor Maximilian of Mexico was shot in 1867. His son, crown prince Rudolph, committed suicide in 1889, and his wife, the Empress Elizabeth, was killed in Geneva, Switzerland, by an Italian anarchist in 1897. The last of these catastrophes was the assassination of the Archduke Franz Ferdinand, nephew of Francis Joseph and heir to the throne. The causes of this last tragedy and its terrible results are explained in the article AUSTRIA-HUNGARY.

Francis of Assisi, SAINT (1182-1226), founder of the Franciscans, born in Assisi, Italy. In 1208 he gave himself to a life of the most rigorous poverty. His followers were at first few, but when they reached the number of twelve he formed them into a new order and made a rule for them, including poverty, chastity, obedience, the giving up of every possession and living by alms. The order was sanctioned, though at first only verbally, in 1210 by Pope Innocent III. Pope Honorius III, in 1216, approved the order. The members were sent out as missionaries, Francis himself going to the East.

Franck, *frank*, CÉSAR AUGUSTE JEAN GUILLAUME HUBERT (1822-1890), a French musician and composer, born at Liège. He studied at the conservatory in his native town and later in Paris, where he finally settled. In 1872 he became organist at the conservatory. His compositions for the organ, though numerous, had attained little recognition before this time, and his oratorio *Ruth*, produced in 1846, was not successful. However, a quarter of a century afterward it was highly praised by French musicians. He is also known by his oratorio *The Beatitudes* and by his *Symphonic Variations* for piano and orchestra.

Franco-German War, the conflict between France and Germany in 1870 and 1871. The real cause of the struggle was the jealousy which France felt of Prussia, who had by her overthrow of Austria placed herself at the head of affairs in Germany and was threatening the position of France in Europe. The immediate cause, however, was the offer by General Prim of the crown of Spain to Leopold of Hohenzollern, a prince of the reigning house of Prussia. Napoleon III demanded of the king of Prussia that he should forbid Leopold to accept the candidacy, and when the prince voluntarily retired, Napoleon still insisted that the renunciation should be made formally by the king and that a guarantee should be given that the refusal was final. Prussia of course refused this demand, and the result was a declaration of war by France.

In Prussia the inevitability of war had long been foreseen, and the country was well prepared. In France, however, conditions were much less favorable, and Napoleon III was completely deceived as to the resources which he should have at his command. Thus, at the outset of the struggle the French had an army only about half as large as the Prussian, while back of the latter was a large reserve force. From the first France met with defeats. At Weissenburg and at Wörth the Germans were victorious, and they at length succeeded in separating the two divisions of the French army under MacMahon and Bazaine and preventing their junction. MacMahon, in September, 1870, was surrounded at Sedan by a German force overwhelmingly greater in number than his own and was on the following day compelled to surrender both army and fortress. Among the prisoners was Napoleon III. Meanwhile, Bazaine had been shut up in Metz, and in October of the same year he, too, was forced to surrender.

One of the first consequences of the defeat at Sedan was the deposition of Napoleon and the proclamation of the Republic. Immediate preparations were made in Paris to withstand a siege by the Germans, but the utmost efforts of the French could not relieve the city, and in February, 1871, it was forced to yield. By the terms of the treaty, which was signed in May of the same year, France was obliged to give up Alsace and a part of Lorraine and pay a war indemnity of about \$1,000,000,000; and it was provided that a German army should hold certain departments of France until the entire indemnity was paid. It was three years before the last of the German army left France.

Franklin

Fran'colin, a genus of birds, related to the partridges and found in Asia and Africa. There are more than forty species, most of which are considered good game birds. The commonest is called the *redwing*, in South Africa, where the English colonists hunt it. The birds are very rapid on their feet and fly heavily with a whirring noise. They feed in the evening and morning, accompanying their labors with a loud, shrill cry that sounds somewhat like laughter.

Frank'fort, IND., the county-seat of Clinton co., 45 mi. n. w. of Indianapolis, on the Vandalia Line, the Lake Erie & Western and other railroads. The city is in an agricultural district, is supplied with natural gas and has manufactures of flour, crackers, lumber, bricks, machinery, agricultural implements and other articles. It supports a public library and has a fine courthouse and a high-school building. Population in 1910, 8634.

Frankfort, Ky., the capital of the state and the county-seat of Franklin co., 55 mi. e. of Louisville, on the Chesapeake & Ohio, the Louisville & Nashville and other railroads, and on the Kentucky River, in the heart of the blue-grass region. The stream is navigable and furnishes water power for numerous manufactures. On a hill near the city is the Franklin Cemetery, which is considered one of the most beautiful in the South. Here Daniel Boone is buried. The prominent buildings include the governor's mansion, the statehouse, an arsenal, the penitentiary, the home for feeble-minded children and the state normal school for colored students. Frankfort was founded by General James Wilkinson in 1786 and became the capital when the state was admitted to the Union. During the Civil War it was for a time the headquarters of General Braxton Bragg, with his Confederate forces. Population in 1910, 10,465.

Frankfort-on-the-Main, a town of Prussia, in the province of Hesse-Nassau, 20 mi. n. e. of Mayence (Mainz), mainly situated on the right bank of the Main. It has many very handsome, and some palatial, private residences, with gardens. The Römberg and the Rossmarkt are the chief squares in the town. The Römer, or townhouse, was erected about 1405, but was not completed in its present form till 1740. The most remarkable of the churches is the Dom, or Cathedral, of Saint Bartholomew. Other buildings are the new opera house, one of the finest buildings of the kind; the courts of justice, of modern construction; the new exchange, a spacious and handsome edifice; the large palace

Frankland

of the prince of Thurn and Taxis; the new railway station, a very elegant edifice, one of the finest in the world; the archive building; the postoffice; the house in which Luther dwelt and that in which Goethe was born. There are monuments to Gutenberg, Goethe, Schiller and others. Frankfort is rich in collections connected with literature and art and in establishments to promote them. The chief of these are the Historical Museum, the Städel Art Institute and the Rothschild Library. The manufactures, though not important, comprise chemicals, ornamental articles of metal, sewing machines, straw hats, soap, perfumery and beer. A great business is done in money and banking, and Frankfort is one of the chief financial centers of Europe. The town is a great railway center and is now reached by the largest vessels navigating the Rhine. It dates from the time of Charlemagne. In the thirteenth century it became a free city and for a long time after this was the place of the election of the German emperors. It was a prosperous and powerful city up to the time of the wars of the French Revolution, when it declined. On Napoleon's downfall, Frankfort became a free city, and by the Congress of Vienna (1815) it was made the seat of the German diet. In 1866 it was incorporated with Prussia. Population in 1910, 414,576.

Frankfort-on-the-Oder, a town of Prussia, in the province of Brandenburg, on the Oder, 52 mi. e. s. e. of Berlin. Among the chief buildings are the Church of Saint Mary, the Rathaus and a theater. The manufactures consist of machinery and metal goods, chemicals, leather, earthenware and spirits; and the trade is extensive, both by land and water. It has always been an important commercial center. Population in 1910, 68,230.

Frank'ing, the privilege of sending letters and packages through the mail without charge. The right was abolished by Parliament in Great Britain in 1840. In the United States it was first granted to Revolutionary soldiers, then to various officers of the government and to senators and representatives in Congress. It was abolished in 1873, but was later restored. It is now possible for all officers of the government to send public documents through the mail without charge. Seeds and agricultural reports are also sent free of charge. Some officers are allowed to use free stamped envelopes, marked *Official Business*.

Frank'land or **Frank'lin**, a name given to a state organization by inhabitants of what is now

Tennessee, then a part of North Carolina, in 1784. A constitution was framed and ratified, and a legislature and a governor, John Sevier, were elected; but after a somewhat bitter struggle, the new government was suppressed by North Carolina in 1788. In 1790 the territory of Tennessee was ceded to the United States government, and thus the disturbance was quieted. See TENNESSEE, subhead *History*.

Frank'lin, a district of Canada, composed of all the islands north of the mainland, including Baffin Land and Prince Albert Land. The area is estimated at 500,000 square miles. No estimate of the population has yet been made, but it probably does not exceed a few hundred. Only one projection of Baffin Land extends below the Arctic Circle, and the whole territory is practically destitute of animal or vegetable life.

Franklin, Mass., a town in Norfolk co., 27 mi. s. w. of Boston, on the New York, New Haven & Hartford railroad. It contains the Dean Academy, an almshouse and a public library. There are manufactures of pianos and of straw, cotton, wool, felt and other goods. It was incorporated in 1778. Population in 1910, 5641.

Franklin, N. H., a city in Merrimack co., 95 mi. n. w. of Boston, Mass., on the Boston & Maine railroad and at the junction of the Pemigewasset and the Winnepesaukee rivers, where they unite to form the Merrimac. There is good water power, and the industries include paper mills, foundries and manufactures of woollens, hosiery, needles and other articles. Franklin is the birthplace of Daniel Webster. It was incorporated as a town in 1828 and became a city in 1895. It is the seat of the New Hampshire Orphans' Home. Population in 1910, 6132.

Franklin, Pa., the county-seat of Venango co., 123 mi. n. of Pittsburg, on the Allegheny River and on the Pennsylvania, the Erie and other railroads. The city is in the great oil fields and has flour mills, machine shops, foundries, brick-yards and manufactures of tools and other articles. The place was settled about 1753. Population in 1910, 9767.

Franklin, BATTLE OF, a battle of the Civil War in America, fought Nov. 30, 1864, at Franklin, Tenn., between a Federal force of about 25,000 under General Schofield and a Confederate force of about 40,000 under General Hood. It was the result of Hood's plan to draw Sherman from his advance to the sea by taking a large Confederate force into Tennessee and Kentucky and threatening the North Central

states. Thomas had been detached from Sherman's army and sent north to Nashville. Schofield was also given a considerable force, with instructions to delay Hood's advance northward as long as possible. The Confederates gradually forced Schofield to retreat toward Nashville, but the Federals made a stand at Franklin, on the south side of the Harpeth River. At first, through a misunderstanding of orders, the Federals were thrown into great confusion, but after a long struggle the Confederates were compelled to withdraw from the attack and Schofield retreated across the river and withdrew toward Nashville. It was one of the most sanguinary contests of the war and was noted for remarkable gallantry on the part of both forces.

Franklin, BENJAMIN (1706-1790), an American scientist, author and statesman, born at Boston, of humble parentage. He was apprenticed to his brother in the printer's trade and found opportunity to write secretly some articles in prose and poetry for the *New England Courant*, which his brother published. They were well received, but when his brother learned of their authorship, Franklin was severely lectured for his presumption and was treated with great harshness. Soon after, he quitted his brother's employment and, at the age of seventeen, started for Philadelphia, where he obtained work as a compositor. There he attracted the notice of Sir William Keith, the governor of Pennsylvania, who induced him to go to England, for the purpose of purchasing types to establish himself in business. Keith's support was soon withdrawn, and after a residence of eighteen months in London, Franklin returned to Philadelphia, where in a short time he formed an establishment with a person who supplied the necessary capital. They printed a newspaper, the *Pennsylvania Gazette*, which was managed with much ability. By Franklin's exertions a public library, improved systems of education, a scheme of insurance and other philanthropies were established in Philadelphia. In 1732 he began to publish his *Poor Richard's Almanack*, which was issued till 1757, winning for him a wide reputation as philosopher and wit.

In Boston in 1746 he saw, for the first time, some electrical experiments, which led him to begin those investigations which resulted in the identification of lightning and electricity and the invention of the lightning conductor. As member of the provincial assembly of Pennsylvania he became very active and was sent in 1757 to England as the agent of the province and was



BENJAMIN FRANKLIN
From a painting in the Athenaeum, Boston

also soon appointed agent of the provinces of Massachusetts, Maryland and Georgia. Oxford and Edinburgh conferred on him their highest academic degrees, and the Royal Society elected him a fellow. In 1762 he returned to America, but was again appointed agent in 1764 and took to England a remonstrance against the project of taxing the colonies. He opposed the Stamp Act and in 1774 presented to the king the petition of the first American Congress, but realizing the futility of his efforts, he returned to America and was elected member of Congress. He exerted all his influence in favor of the Declaration of Independence. In 1776 he was sent to France as minister plenipotentiary, to obtain supplies from that court, and he concluded with France the first treaty of the United States with a foreign power (1778). He was subsequently named one of the commissioners for negotiating the peace with England. On his return to his native country, in 1785, he filled the office of president (governor) of Pennsylvania, served as a delegate in the Federal convention in 1787, approved the Constitution and did much to secure its ratification. His works include an unfinished *Autobiography* and a great number of political, anti-slavery, financial, economic and scientific papers.

Franklin, JOHN, Sir (1786-1847), an English Arctic voyager. He entered the navy as a midshipman at the age of fourteen and was present at the Battle of Copenhagen in 1801. He afterward accompanied Captain Flinders on his voyage to the coast of Australia (1801-1803). Shortly after his return he was appointed to the *Bellerophon* and had charge of her signals during the Battle of Trafalgar. His arctic work began in 1819, when he conducted an overland expedition for the exploration of the north coast of America, from Hudson Bay to the mouth of the Coppermine River. In 1845 he took command of the *Erebus* and *Terror* for an expedition in search of the Northwest passage. He never returned, and numerous search parties were sent out before any trace of him was found. In 1859 a document was found which gave the latest details of the ill-fated expedition. This paper stated that Sir John died June 11, 1847; that the ships were abandoned in April, 1848, and that the crews, 105 in number, had started for the Great Fish River. None survived, but many relics of the party have been recovered.

Franklin, WILLIAM BUEL (1823-1903), an American soldier, born in York, Pa. He graduated at West Point in 1843 and served in the Mexican War. Later he was appointed instruc-

tor at West Point, and at the outbreak of the Civil War he was appointed brigadier general. He served in the Battle of Bull Run and commanded a division and then a corps of the Army of the Potomac, in the Peninsula Campaign. In the following year he was promoted to be major general of volunteers, and, as commander of a corps, participated in the battles of Antietam and Fredericksburg. In the latter battle his dilatory conduct led to his temporary suspension, but he later served in the South. In March, 1865, he was brevetted major general in the regular army, but resigned from the service in 1866, engaging in the manufacture of firearms at Hartford, Conn.

Franz-Joseph Land, *frants'yo'zef lahnt*, an island group in the Arctic Ocean, lying n. of Nova Zembla. It consists of about 60 islands, much broken up by fiords and channels. The surface is made of basaltic rocks and is a plateau from 400 to 500 feet above the sea. The highest points rise to about 2800 feet. This land is largely covered by glaciers, though in some places lichens, mosses, poppy, saxifrage and other Arctic plants grow. It was discovered by the Austro-Hungarian expedition under Weyprecht and Payer, in 1873.

Fraser River, the principal river in British Columbia. It has its origin in the union of two branches. The one to the west receives its waters from a series of lakes, and, flowing in a southeasterly direction for 260 miles, it unites near Fort George with another branch from the east, which rises in the Rocky Mountains. From this point it flows south, and after a total course of about 750 miles it falls into the Gulf of Georgia. Its chief tributaries are the Stuart, the Chilcoten and the Thompson. Gold is found both on the Fraser and its affluents, and the salmon fisheries are important. New Westminster, Hope, Yale and Lytton are on its banks. Between Lytton and Yale the Fraser flows through some of the most beautiful scenery in the country.

Fraternal Insurance. See FRATERNAL SOCIETIES; INSURANCE.

Fraternal Societies or **Friendly Societies**, societies formed for the mutual advantage of the members and based upon the principle that by the contribution of the savings of many persons to a common fund, the most effectual provision can be made for casualties likely to affect all contributors. In England these societies are called *friendly societies*. They were first organized as sick clubs, composed of friends who

met occasionally for recreation and social pleasure and who paid small sums to a common fund, for the benefit of sick members, or to pay the funeral expenses of deceased members. These societies have now become to a large extent fraternal insurance orders, and in addition to sickness and funeral benefits, they pay many other allowances, including accident and life insurance, old age pensions, widows' and orphans' annuities, and maintain homes and asylums for aged or invalid members. The Ancient Order of Foresters is the largest organization of the kind in England, while the Independent Order of Odd Fellows, organized in England, but now centered in the United States, is the largest order in the world. Fraternal societies in the United States have a total membership of over nine million. The principal orders and their membership in 1913 are given below:

Odd Fellows.....	1,581,045
Free Masons.....	1,567,800
Modern Woodmen.....	960,000
Knights of Pythias.....	715,654
Order of the Eastern Star.....	700,000
Woodmen of the World.....	642,300
Improved Order of Redmen.....	497,946
Knights of the Maccabees.....	283,901
Royal Arcanum.....	248,868
Foresters of America.....	241,439
Independent Order of Foresters.....	242,000
Eagles.....	347,569
Ancient Order of Hibernians.....	250,000
Benevolent and Protective Order of Elks.....	408,281
Knights of Columbus.....	287,313
Nobles of the Mystic Shrine.....	185,446

Frater'nities, COLLEGE, or "Greek letter" societies, as they are often called, organizations of students in colleges and universities of the United States. They receive their names from two or more letters of the Greek alphabet, as *Delta Kappa Epsilon*. Each of these letters is the beginning of a word of the secret motto of the fraternity. The purpose of such societies is literary and social. A fraternity is made up of several chapters in various colleges throughout the Union, but there can be only one chapter of the same society in a college. Each fraternity has a general government and holds conventions either annually or biennially. There are also some local organizations, which have but one chapter. The number of chapters in various fraternities varies from four to seventy-five. There are several professional fraternities, composed of students in medical, law and dental institutions. There are several similar organizations of young women, known as sororities. The first fraternity formed was *Phi Beta Kappa*,

founded at William and Mary College, Va., in 1776. This is now an honorary organization. There are at present over a hundred college fraternities in the United States. Among the oldest, excepting the *Phi Beta Kappa*, were *Alpha Delta Phi*, 1832, at Hamilton College, N. Y.; *Psi Upsilon*, 1833, at Union College, N. Y.; *Kappa Alpha*, 1835, at Union College, N. Y.; *Beta Theta Pi*, 1839, at Miami College, Ohio; *Chi Psi*, 1841, at Union College, Schenectady, N. Y.; *Delta Kappa Epsilon*, 1844, at Yale.

The first women's fraternities, or sororities, to be organized were the *Kappa Alpha Theta*, at De Pauw University, in 1870; *Kappa Kappa Gamma*, at Monmouth College, 1870; *Delta Gamma*, at the University of Mississippi, 1872; *Alpha Phi*, at Syracuse, 1872; *Gamma Phi Beta*, at Syracuse, 1874.

Fraud, an act or course of deception, deliberately practiced with the view of gaining an unlawful or unfair advantage and resulting in legal injury to another. All frauds or attempts to defraud, which cannot be guarded against by common prudence, are indictable at common law and are punishable arbitrarily, according to the heinousness of the offense. Every species of fraud which the law recognizes renders voidable every transaction into which it enters as a material element. Fraud may be by false representation of fact, by concealment of material circumstances that ought to be revealed, by underhanded dealing or by taking advantage of imbecility or intoxication. A fraud involved in an act or contract which, though not originating in any actual evil or fraudulent design, yet has a tendency to deceive or mislead other persons, or to violate public or private confidence, or to impair or injure the public interests, is not actionable in a court of law, but is recognized in a court of equity, where it is known as *constructive fraud*. A suit for recovery of goods or for damages in such a case is usually sustained.

Fraunhofer, *frown'ho fur*, JOSEPH VON (1787-1826), a German optician. His many improvements in glass making, in optical instruments and in the polishing of lenses were eclipsed by his investigation of the innumerable, dark, fixed lines in the solar spectrum, known as *Fraunhofer's lines*. The importance of this discovery can scarcely be overestimated. It led to the invention and use of the spectroscope, to the science of spectroscopy and to all our present knowledge of solar and stellar chemistry.

Frechette, *fra shet'*, LOUIS HONORÉ (1839-1908), a French-Canadian author, born at Point Lévi, Quebec. He was educated at Quebec Seminary and Laval University, studied law and was called to the bar of Lower Canada. After engaging for some years in newspaper work in Chicago he returned to Canada and represented his native county in the Dominion Parliament from 1874 to 1879. He then again took up newspaper work and was editor of several French papers in Chicago, Quebec and Montreal. His published collections of poems include *My Leisure Hours*, *Pell-Mell* and *The Legend of a People*; he translated Howell's *A Chance Acquaintance* and Cable's *Creole Days* into French and wrote numerous essays. The French Academy elected him a member and he was a knight of the Legion of Honor.

Fred'eric, HAROLD (1856-1898), a journalist and novelist, born in Utica, N. Y. He graduated at Hamilton College when twenty years old. Beginning his career as a proof reader, he rapidly advanced until he became the London correspondent of the *New York Times*. After going to England, in 1884, he wrote several novels, chiefly of rural life in his native state. Prominent among them are *Seth's Brother's Wife* and *The Damnation of Theron Ware*, the latter a vivid analysis of a phase of religious life in America.

Fred'erick, Md., the county-seat of Frederick co., 60 mi. n. w. of Baltimore, on Carroll's Creek and on the Baltimore & Ohio and the Pennsylvania railroads. The city has large canning establishments, planing mills, brick yards, flour mills and manufactures of tobacco, hosiery and other articles. Its chief interest lies in its connection with important historical events and characters: During the Civil War the place was twice occupied by Confederate troops, and the second time the citizens were forced to pay a very heavy ransom. Whittier has caused Frederick to be ever remembered as the scene of his famous poem, *Barbara Frietchie*. The place was settled about 1745 and was incorporated in 1817. Population in 1910, 10,411.

Frederick, a name borne by European sovereigns of various nations. Among them may be mentioned *Holy Roman emperors*, Frederick III (1415-1493) (See also FREDERICK I, BARBAROSSA; FREDERICK II); *kings of Prussia* (See FREDERICK I; FREDERICK II; FREDERICK III); *kings of Denmark*, Frederick I (about 1471-1533), Frederick III (1609-1670), Frederick V (1723-1766), Frederick VI (1768-1839) and

Frederick VII (1808-1863). See also FREDERICK VIII, of Denmark.

Frederick I (1657-1713), king of Prussia, son of the great elector Frederick William. He succeeded his father as elector of Brandenburg in 1688 and some years later assumed the title of king of Prussia. His reign was unimportant.

Frederick II (1712-1786), king of Prussia, known as Frederick the Great. He was the son



FREDERICK THE GREAT

of Frederick William I and the princess Sophia of Hanover, sister of George II of England. He was in his youth cruelly treated by his father, and at one time he narrowly escaped the death punishment for an attempt to flee to England. In 1733 he was obliged to marry the princess Elizabeth Christina, daughter of the duke of Brunswick-Bevern. The death of his father raised him to the throne in 1740, and it was not long before he asserted the claims of the House of Brandenburg to a part of Silesia, then held by Maria Theresa. As his proposals were rejected, he occupied Lower Silesia, defeated the Austrians near Mollwitz and at Chotusitz, and the First Silesian War was terminated by the peace signed at Berlin in 1742, leaving Frederick in possession of Silesia. Soon the Second Silesian War broke out, the result of which was equally favorable for Frederick. By the Peace of Dresden he retained Silesia and acknowledged the husband of Maria Theresa, Francis I, as emperor.

During the years of peace which followed,

Frederick

Frederick devoted himself to domestic administration and to the improvement of the military system. He perfected the organization of his army, and learning that Maria Theresa, who had made strong alliances, meant to make a renewed attempt to gain Silesia, he anticipated his enemies by the invasion of Saxony (1756), with which the Seven Years' War began. The Peace of Hubertsburg (1763) terminated this war, and Frederick was allowed to keep the territory over which there had been so much contention. Frederick came out of this war with a reputation which promised him, in the future, a decisive influence in the affairs of Germany and Europe. His next care was the relief of his kingdom, drained and exhausted by the contest. This he prosecuted with great diligence and liberality, making many improvements in institutions and in agriculture. On the partition of Poland in 1772 Frederick received a large accession to his dominions. In 1779 he frustrated the designs of Emperor Joseph II on Bavaria, and the War of the Bavarian Succession was terminated without a battle by the Peace of Teschen. Late in life Frederick concluded, in connection with Saxony and Hanover, the confederation of the German princes. Frederick was a patron of literature and a friend of Voltaire, who lived for some time at his court, and he was himself the author of several works.

Frederick III (1831-1888), king of Prussia and emperor of Germany. In 1858 he married the princess royal of Britain, eldest daughter of Queen Victoria. He commanded the army of the Oder in the war with Austria (1866), and in the Franco-German War he led the army which ultimately forced Napoleon III and his army to surrender at Sedan. Early in 1888 he came to the throne, but he died three months later and was deeply mourned.

Frederick I, BARBAROSSA (1122-1190), Holy Roman emperor, received the imperial crown in 1152 on the death of his uncle, the emperor Conrad III. His principal efforts were directed to the extension and confirmation of his power in Italy. He set out on a crusade to the Holy Land in 1189 and gained two victories, but was drowned while crossing a stream in Cilicia. Frederick was one of the wisest and best of the emperors, and the belief was long current in Germany that he would some day return to rule his people.

Frederick II (1194-1250), son of the emperor Henry VI and of Constance, heiress of Sicily. He remained under the guardianship of Pope

Fredericksburg

Innocent III till 1209, when he took upon himself the government of Lower Italy and Sicily. Three years later he was crowned emperor, promising to undertake a crusade in return for the pope's aid against his rival, Otho IV. It was not, however, until 1227 that he actually set out on that expedition. Frederick's ambition aimed at the subjugation of Lombardy, the sovereignty of all Italy and the reduction of the popes to their old spiritual office as the leading bishops in Christendom. This led him into constant struggles in Germany and Italy. He was one of the ablest and most accomplished of the long line of German emperors.

Frederick VIII (1843-1912), king of Denmark, succeeded his father, Christian IX, in 1906. Frederick was married in 1869 to Louisa, daughter of Charles XV of Sweden and Norway, and eight children were born to them. At Frederick's death his son succeeded as Christian X.

Fredericksburg, VA., a city in Spottsylvania co., 60 mi. n. of Richmond, on the Rappahannock River and on the Potomac, Fredericksburg & Piedmont and the Richmond, Fredericksburg & Potomac railroads. The manufactures include flour, silk, woolen and leather goods, iron, shoes, cigars and other articles. The town was connected with Captain John Smith and his early adventures. During the Civil War it changed hands several times and was the scene of several important battles (See FREDERICKSBURG, BATTLE OF). The city has a public library, a beautiful park and Stonewall, Confederate and National cemeteries. Population in 1910, 5874.

Fredericksburg, BATTLE OF, one of the most important battles of the Civil War, fought December 13, 1862, between a force of 125,000 Federals under General Burnside, supported by Sumner, Hooker and Franklin, and a force of 80,000 Confederates under Lee, supported by Jackson and Longstreet. After Lee's retreat from his first invasion of the North, the two armies had returned to their former positions near Fredericksburg, Lee occupying a practically impregnable position on bluffs overlooking the town, while Burnside was at Falmouth, on the opposite bank of the Rappahannock. On December 12, however, he crossed the river in three divisions and advanced against Lee on Marye's Heights. After six assaults which resulted in not the slightest gain, but in terrible slaughter, he was compelled to withdraw. His loss was 12,500, while that of the Confederates

was about 5400. This battle resulted in the removal of Burnside from the command of the Army of the Potomac. See CIVIL WAR IN AMERICA.

Frederick William (1620-1688), elector of Brandenburg, generally called the Great Elector. At the age of twenty he succeeded his father, and he found the country devastated by the Thirty Years' War and weakened by the misrule of his predecessors. He must be considered as the founder of Prussian greatness and as the creator of a military spirit among his subjects. His part in the wars against Louis XIV, and especially his victory over the Swedes at Fehrbellin, gave to his country a prominence which it had never before attained. He left to his son a country enlarged and improved and a well-supplied treasury.

Frederick William I (1688-1740), king of Prussia, son of Frederick I and father of Frederick the Great. On his accession to the throne in 1713, he endeavored to increase the army and reform the finances, and he became the founder of the exact discipline and regularity which have since characterized the Prussian army. He had a childish love for tall soldiers, and he brought tall men from all countries and compelled them to serve in his army. A large part of Swedish Pomerania was annexed to Prussia during his reign.

Frederick William III (1770-1840), king of Prussia, son of Frederick William II, whom he succeeded in 1797. During the early part of the Napoleonic struggle he remained neutral, but popular feeling finally compelled him to join the coalition against France, and Prussia suffered much through defeats at Jena, Auerstädt, Eylau and Friedland. After peace was secured, Frederick William showed himself largely in favor of the reactionary principles of Metternich and the Holly Alliance.

Frederick William IV (1795-1861), king of Prussia, son of Frederick William III. When he succeeded to the throne by the death of his father in 1840, he gave some slight promise of a liberal government, but he soon showed his reactionary tendencies, and in 1848 occurred the rising of the people and the demand for a constitution. Frederick was able to force upon the country a constitution of his own making, which allowed small concessions. Latterly his mind gave way, and he sank into a state of hopeless imbecility.

Fredericton, a city of New Brunswick, the capital of the province, on the Saint John River,

84 mi. from its mouth, and on the Canadian Pacific, the Canada Eastern and other railways. The river is navigable to this point for large sea-going vessels. The city is well built and has a number of handsome public buildings. Lumbering and trading are the chief industries, but there are also manufactures of machinery, leather and boots and shoes. The original village, known as Saint Anne, was founded in 1740. Population in 1911, 7208.

Fredo'nia, N. Y., a town of Chautauqua co., on the Dunkirk, Allegheny Valley & Pittsburg railroad, 45 mi. s. w. of Buffalo. A state normal school and a free library are located here. The industries of the village are largely connected with the grapes which are so extensively raised in the surrounding district. Fredonia was settled in 1803 and was incorporated in 1829. Population in 1910, 5285.

Free Church of Scotland, a Presbyterian church organized as a separate body from the Established Church in 1843. In 1834 the general assembly passed a *veto act*, which declared that no minister should be appointed to a parish church against the will of the people, and that a majority of male heads of families, full members of the church, should be able to bar such a person. This act brought the ecclesiastical and civil powers into conflict. The struggle was brought to an issue by the judgment of the House of Lords in 1842, affirming a decree of the court of session, which required the presbytery of Auchterarder to place a minister in Auchterarder parish without regard to the dissent of the parishioners. In 1843, when the members of the general assembly met at Edinburgh, they protested against the interference of the civil courts with the Church, and some of them withdrew and formed the Free Church of Scotland.

Free Cities, a name given to certain cities of Germany which were members of the German Confederation and exercised sovereign jurisdiction within their own boundaries. At the time of the French Revolution the free or imperial cities numbered no fewer than fifty-one; but with the exception of Hamburg, Lübeck and Bremen, they have all been deprived of their privileges as a result of various political changes.

Freedmen's Bureau, a bureau organized in the war department of the United States by an act of Congress passed March 3, 1865. Its purpose was to take general charge of the enfranchised negroes of the South, and it was authorized to assign to the freedmen allotments

of public lands, consisting of certain confiscated or abandoned lands. A bill continuing it for two years was vetoed by President Johnson in 1866, but was passed over the veto. The bureau continued its work until 1870 and expended over \$15,000,000. It was one cause of perpetuating the enmity of the South toward Congress, for it led to the congregation of idle and vicious negroes in the vicinity of the bureau depots and caused great hardship to the planters, who could not secure sufficient labor to harvest their cotton.

Free'land, PA., a borough in Luzerne co., 30 mi. s. w. of Scranton, on the Lehigh Valley railroad. It is in the anthracite coal region and is surrounded by a fertile agricultural district. There are foundries, machine shops, lumber mills and other factories. Its growth has been very rapid during the last decade. Population in 1910, 6197.

Free'man, a term which in its most general sense signifies one who is born free, with the full rights and privileges of citizenship, as distinguished from *freedman*, one who has been in bondage but has been delivered, and who usually is not given full social or political equality with a freeman. Among Teutonic peoples the idea of a freeman is usually based upon the possession of land, and in England and America during the colonial times the terms *freeman* and *freeholder* were identical.

Freeman, EDWARD AUGUSTUS (1823-1892), an English historian and archaeologist, educated at Trinity College, Oxford. In 1883 he became regius professor of modern history at Oxford. His first work was *A History of Architecture*, but he first made himself a name among English historians by the publication, in 1867, of the first volume of his *History of the Norman Conquest*, which has remained his chief work. Others of his writings are *Some Impressions of the United States*, *History and Conquest of the Saracens* and *Growth of the English Constitution*.

Freeman, MARY E. WILKINS (1862-), an American novelist. Her striking pictures of the colorless, dull lives of the middle class in New England have given her rank as one of the most important of contemporary novelists in America. Chief among her works are *Pembroke*; *A Humble Romance*; *Silence and Other Stories*; *Jerome, a Poor Man*; *The Portion of Labor*, and *The Wind in the Rose Bush*. Since her marriage in 1901 to Dr. Charles M. Freeman, Mrs. Freeman has lived in Metuchen, N. J.

Free Ma'sonry. See MASONS, FREE

Free Meth'odists, members of a religious sect, the outgrowth of the Methodist Episcopal Church. It was formed at Pekin, N. Y., in 1860, by the followers of two Methodist ministers who were expelled from the conference. Though agreeing in the main with Methodist doctrines, the Free Methodists have abolished the office of bishop and substituted that of an elective superintendent, with a term extending over four years; they exclude instrumental music in their services, have only extemporaneous preaching, insist on plainness of dress and living and admit all freely to their services, having no paid reserved pews. Their membership is about 30,000, and their churches number about 1000.

Free Port, a harbor where ships of all nations may enter, on payment of a moderate toll, and may load or unload. Goods may be stored at first at free ports without paying any duty; the goods may then be either reshipped for export, on paying a mere transit duty, or they may be admitted for home consumption, on payment of the usual full customs of the country.

Free'port, ILL., the county-seat of Stephenson co., 55 mi. s. e. of Dubuque, Iowa, on the Pecos River and on the Chicago & Northwestern and the Illinois Central railroads. The city contains railroad shops, coffee mills and manufactures of organs, wagons, bicycles and other articles. It has a public library, Saint Francis Hospital, several fine public buildings and a good system of schools. Freeport was settled in 1835 and was chartered in 1885. Here in 1858 occurred a noted debate between Lincoln and Douglas, in which Douglas set forth the doctrine later known as the *Freeport heresy*. Population in 1910, 17,567.

Free-soil Party, an anti-slavery party which came into existence in 1848. It was formed at a convention held in Buffalo, which was attended by representatives of the old Liberty party, but was chiefly supported by the Barnburners, or Van Buren faction of New York Democrats. The convention nominated Van Buren for president and Charles Francis Adams for vice-president and declared that Congress should keep slavery out of the territories. The party polled almost 300,000 votes in that year, principally in the states of New York, Massachusetts and Ohio, and secured fourteen congressmen. In 1852, having been deserted by Van Buren's followers, the party's candidates, John P. Hale and George W. Julian, received only 155,000 votes. The party was absorbed into the Republican party at its organization in 1854.

Freethinkers, an epithet applied to the English deists of the seventeenth and eighteenth centuries, who argued for natural, as against revealed, religion. Anthony Collins (who first made it a name of a party by his *Discourse of Freethinking*), and his friend, John Toland, are among the chief of the early freethinkers. Lord Bolingbroke and Hume take the lead among advanced freethinkers. In France, Voltaire and the encyclopedists, D'Alembert, Diderot and Helvetius, led the opposition against revealed religion. The same spirit became fashionable in Germany in the reign of Frederick the Great. The term is now generally applied to those found among Christians, as well as non-Christians, who refuse to accept revelation and base their religious beliefs upon reasoned doctrines.

Free town or **Saint George**, the capital of the British colony of Sierra Leone, one of the important seaports of the western coast of Africa. The exports of the city consist largely of india rubber, palm oil, gums, hides, and gold and silver filigree work made by the natives. The town is a British coaling station and the headquarters of the British forces in West Africa. Population in 1911, 34,090, of whom only about 200 were Europeans.

Free Trade, the term applied to national commerce, when relieved from such interference as is intended to improve or otherwise influence it; that is, unrestricted by laws or tariffs and not unduly stimulated by bounties. In all countries it was long held to be of importance to encourage native production and manufactures by excluding from their own markets, and from the colonial markets over which they had control, the competing produce and manufactures of other countries. On this theory the great body of British commercial legislation was founded until 1846, when the policy of free trade in grain was introduced. Free trade was gradually extended, by the repeal of the navigation laws in 1849 and by other great measures, until nearly all British commercial legislation has been brought into conformity with it. Free trade has not been adopted by any nation except Great Britain. As an economic principle free trade is the direct opposite of the principle of *protection*, which maintains that a state can reach a high degree of material prosperity only by protecting its domestic industries from the competition of all similar foreign industries. To effect this, protecting countries either prohibit the importation of foreign goods by direct legislation or impose such duties as shall check the introduc-

tion of foreign goods. The principle of free trade was first urged by Adam Smith, in his *Wealth of Nations*, and is now held to be correct in theory by most economists. See **TARIFF**; **PROTECTION**.

Free Will, the power of choice between two courses of conduct. The extent to which an individual possesses this power has been the source of long controversies among both theologians and psychologists. Among theologians the principal theories are four in number, namely: First, that an act of the will is the result of circumstances and conditions beyond the person's control; second, that human affairs are governed by natural law, which acts always in the same way, hence the will always acts in accordance with that law; third, that every person's conduct is the logical and inevitable result of his previous experience and activity, and that the individual will choose in each emergency the line of conduct which his whole past experience has prepared for him; fourth, that the human will possesses of itself a special and innate power to choose between alternatives. This power it often reserves and does not always use, but when called upon, it is always present, and the individual is personally and individually responsible for every act which he does of conscious choice.

Freezing, the changing of a liquid into a solid by lowering its temperature. Each liquid always solidifies at the same temperature, which is called its *freezing point*, and the solid also melts again at the same temperature. Thus, the freezing point and the melting point, or *point of fusion*, are the same, and the point is always the same for the same substance. Consequently the freezing point of water, or the melting point of ice, 32° F., is taken for one of the fixed points in the thermometer (See **THERMOMETER**). The freezing point of mercury is 39° below zero, of sulphuric ether 46° below zero, of alcohol 203° below zero, Fahrenheit.

Freiberg, *fri'berK*, a German mining town, the center of the mining district of Saxony, 20 mi. w. s. w. of Dresden, near the Mulde. There are still remains of its former walls, towers and ditches. The principal buildings and establishments are the cathedral, the mining academy, with a museum attached, the townhouse, the castle and the royal silver refinery. The Freiberg district yields silver, copper, lead and cobalt. Population in 1910, 36,237.

Freiburg, *fri'boorK*, a town of Baden, on the Dreisam, 42 mi. s. s. e. of Strassburg. The

chief buildings are the cathedral, a large and beautiful Gothic structure, with a fine portal, richly sculptured and surmounted by a tower, with a spire of exquisite open work 380 feet high; the Ludwigskirche; the university, founded in 1456; the museum; a theater, and the grand-ducal palace. The manufactures are numerous and include tobacco, leather, chocolate and glass. Population in 1910, 83,324.

Freight, *frate*, a term used to denote merchandise in process of transportation; also the amount given for the transportation of merchandise. It was originally applied only to merchandise carried by water, but its meaning has now been extended to cover the transportation of goods by land, as well. The transportation of freight is governed by a contract, usually called a *bill of lading*, which may stipulate certain conditions of carriage; but in general it must conform to common usage. The most important principle of the law governing freight is that compensation is earned only when the contract has been fully performed; for instance, if the contract states that the cargo is to be deposited at a certain point, the carrier cannot claim compensation for a part of the voyage if the freight is not delivered at the specified destination. See CARRIER, COMMON; BILL OF LADING.

Frelinghuysen, FREDERICK THEODORE (1817-1885), an American lawyer and politician, born in Millstone, N. J., educated at Rutgers College. He was admitted to the bar and became city attorney of Newark in 1849. He was also widely known as a corporation lawyer and was a prominent Whig and Republican. From 1861 to 1866 he was attorney-general of the state and in the latter year was appointed United States senator to fill a vacancy. In 1870 he was appointed to succeed Motley as minister to Germany, but declined, and in the following year he was elected to the United States Senate. Frelinghuysen was one of the framers of the electoral commission bill in 1876 and served upon the commission. After several years of retirement he succeeded Blaine as secretary of state in 1881.

Fremont', NEB., a city and the county-seat of Dodge co., on the Platte River, 36 mi. w. of Omaha, on the Union Pacific and other railroads. The industrial establishments include breweries, flour mills, iron foundries, planing mills, carriage, furniture and cigar factories, stockyards and pork-packing houses. The town was first settled in 1856 and was incor-

porated in 1871. Population in 1910, 8718.

Fremont, OHIO, the county-seat of Sandusky co., 30 mi. e. of Toledo, on the Sandusky River and on the Lake Shore & Michigan Southern and the Lake Erie & Western and other railroads. Being at the head of steamship navigation on the river and in the center of a rich agricultural region and of productive oil and natural gas fields, it is a city of considerable commercial and industrial importance. Its chief manufactures are agricultural implements, boilers and engines, electro-carbons, cutlery, beet sugar and lumber products. A trading post was established here as early as 1785, and Fort Stephenson was erected in 1812. It was a popular rendezvous of indian tribes. Population in 1910, 9939.

Fremont, JOHN CHARLES (1813-1890), an American soldier and explorer, born in Savannah, Georgia, and educated at Charleston College. He entered the government service as topographical engineer and, in pursuit of a plan to make a geographical survey of all the territories



JOHN C. FREMONT

of the United States, explored the Rocky Mountains in 1842. In the following year he set out to explore the territory between the Rockies and the Pacific coast, and after a trip filled with the greatest hardships, he returned in July, 1844. In 1845 he again led a government expedition to the Rocky Mountain region and came into conflict with the Mexican authorities, who were then preparing for war with the United States. He retired to Oregon, but later returned

to California and led a revolt against Mexican authority, becoming military commander and civil governor of California. Toward the end of 1846, a United States force under General Kearney arrived in California, but Fremont refused to recognize Kearney's authority. For this he was court-martialed and was convicted of mutiny and disobedience and sentenced to dismissal from the service. President Polk remitted this penalty, however, and Fremont resigned. Two years later he led another exploring party across the Rockies; he made a last exploring trip in 1853, but accomplished little. Fremont was the first United States senator from the state of California and in 1856 he was nominated as the first candidate of the Republicans for the presidency, but received only 114 electoral votes to Buchanan's 174. At the outbreak of the Civil War, he was appointed major general, with command of the western department. In this position he hindered the administration by a hasty and ill-advised order of confiscation, and he was removed from command by President Lincoln in November, 1861. He was given command of another department later. In 1864 he became the candidate for president of a small faction of the Republican party. He received little support and withdrew his name in September. After the war he was interested in railroad enterprises and from 1878 to 1882 was governor of Arizona. Consult Fremont's *Memoirs of My Life*.

French, ALICE (1850-), a story-writer, better known as Octave Thanet, born in Andover, Mass., and educated at Abbott Academy there. As she lived in the West and in the South, she drew in her short stories intimate pictures of life in those regions. Among her collections of stories are *Otto the Knight* and *Knitting in the Sun*. *An Adventure in Photography* is illustrated from actual photographs of the adventurers. *We All* is a charming story for children. Among her later works are *The Man of the Hour* and *The Lion's Share*.

French, DANIEL CHESTER (1850-), an American sculptor, born at Exeter, N. H. His first work was very crude, but he studied conscientiously and was encouraged by Louisa M. Alcott, who was his first critic. He began by modeling animals and birds. At the age of nineteen he became a pupil of John Quincy A. Ward and later went to Europe, where he studied at Florence for several months. His first important work was *The Minuteman*, and this was followed by some important portraits and

statues, the best of which are *John Harvard*, *Lewis Cass* and the *Gallaudet Monument*, which is at Washington. Among his other works are a great memorial statue called *Washington*, a bronze statue executed as a gift of American citizens to France; the *Memorial Angel*, a sculpture design for a monument in Boston; the bronze doors for the Boston Public Library, and *Death and the Sculptor*, which is his greatest work, now in New York City. This was one of the best pieces of sculpture at the Chicago World's Fair of 1893.

French and Indian Wars, a name given to the series of four wars between the French and the English in America in the seventeenth and eighteenth centuries. They were the result partly of the conflicting interests in Europe, and partly of the divergent claims of the two countries in America, England holding that settlements upon the coast gave title to land stretching from sea to sea; France, that settlement at the source of a river gave title to all lands drained by the river. As the colonies of both countries expanded westward, migration began, and the representatives of the rivals soon came into conflict.

KING WILLIAM'S WAR. The first war, known in America as King William's War, was simultaneous with the War of the Palatinate in Europe, begun in 1689, and its opening was signalized by expeditions against the frontier towns of New York and New England sent out by Governor Frontenac of Canada. Hundreds of settlers were captured and killed. In retaliation the English colonists sent out two expeditions, one by land and one by sea, for the conquest of Canada. Both failed, and at the Peace of Ryswick in 1697 mutual restitution of all conquered territory in America was made.

QUEEN ANNE'S WAR was the outgrowth of the War of the Spanish Succession waged in Europe. It began in the southern colonies with an expedition from South Carolina against Spanish towns in Florida and a counter-attack upon Charleston. The alliance between the Algonquin Indians and the French in the north proved disastrous to frontier settlements in New England, especially Deerfield and Haverhill, Mass. The English dispatched three expeditions against Acadia, the last one, in 1710, being successful. By the Peace of Utrecht in 1713 the Hudson Bay territory, Acadia and Newfoundland were ceded to England.

KING GEORGE'S WAR consisted of the American operations in the War of the Austrian

French and Indian Wars

Succession. The first movement was a French expedition against British ports in New England and Newfoundland. The most important event of the contest was the brilliant campaign against Louisburg, Cape Breton Island, conducted by colonial forces under William Pepperell of Maine. The stronghold surrendered June 17, 1745. By the Treaty of Aix-la-Chapelle (1748), Louisburg was restored to France, contrary to the wishes of the New Englanders, and all other conquered territory was restored to its status before the war.

THE FRENCH AND INDIAN WAR. The last of the four wars, often known as the French and Indian War, was an American phase of the Seven Years' War between England and France.



FRENCH AND INDIAN WARS IN THE NORTH AND EAST

The three preceding struggles had accomplished nothing toward a final settlement of the territorial controversy, and frontier settlements of the two nations in the north and west constantly approached each other. The opening gun of the war was fired in 1755, when a force of Virginian volunteers under George Washington was compelled to surrender Fort Necessity, which they had built for the defense of the western region. In the same year an English force under General Braddock retaliated for this defeat by an attack upon Fort Duquesne, at the junction of the Monongahela and Allegheny rivers, on the site of the English Fort Pitt. The force was attacked in ambush and completely routed, with great loss. Other expeditions against Canada, by way of Lake

French Indo-China

Champlain and Fort Niagara, were also unsuccessful. Not until 1758 did the tide of fortune turn in favor of England. In that year Louisburg and Fort Duquesne were captured and in the following summer Ticonderoga, Crown Point and Niagara. The crowning and closing event of the war was the successful invasion of Canada by an English force under General Wolfe (See WOLFE, JAMES; MONTCALM, LOUIS JOSEPH; QUEBEC). By the terms of the Treaty of Paris in 1763, Canada and all lands east of the Mississippi were ceded by France to England. Louisiana and all lands west of the Mississippi and the Isle of Orleans were ceded by France to Spain, and Florida was ceded to England by Spain. Thus, France was driven from the North American continent and Spain remained the only rival of England in the New World.

French Broad River, a river of North Carolina and Tennessee, rising in Henderson County in North Carolina. It flows northwest into Tennessee and empties into Holston River four miles above Knoxville. The scenery from Asheville to the Tennessee line is remarkably beautiful, the river flowing through deep mountain gorges. In Buncombe County, North Carolina, these precipices are between 200 and 300 feet high.

French Guiana. See GUI-
ANA, FRENCH.

French Indo-China, the name applied to the French possessions in southeast Asia, including the colonies of Cochin-China and the protectorates of Cambodia, Annam, Laos and Tongking. It is bounded on the east and south by South China Sea, on the southeast by the Gulf of Siam, on the west by Siam and on the north by China. The total area is estimated at 255,000 square miles. The seat of government is at Saigon. At the head of the administration is a governor-general, under whom are the governor of Cochin-China and the superiors of the four protectorates. In 1900 Quang-Chi Wan, on the China coast, was leased from China, and is now a part of Indo-China. Population estimated at 16,000,000 to 20,000,000. See ANNAM; CAMBODIA; COCHIN-CHINA; TONGKING.

French Kongo, a region of west central Africa extending along the coast between the German Kamerun territory on the n. and Kambinda on the s., and inland to the Kongo and Ubangi Rivers. It touches, on the north, Upper Ubangi and Wadai, and covers an area of about 550,000 sq. m., the boundaries being not yet defined. This territory is probably the most valuable of the African colonies. The country is very fertile and produces many important exports. Gold and iron abound in some parts. Rubber, ivory, various woods, coffee, cocoa and palm oil are the chief exports. Among the rivers are the Gabun, Sanga, Ogowai, Lali and Licona, of which the Sanga is an excellent waterway. Loango is the only good harbor, and most of the trade passes through it. Other important towns are Libreville, the capital, Franceville and Brazzaville. The government is administered by a commissioner general and an administrative council, the upper regions along the Kongo being under military control. The coast was first discovered by the Portuguese in 1470. In 1842 the French established a post on the Gabun River and became actively interested, and seven years later Libreville was founded. The population is estimated at between 8,000,000 and 15,000,000.

French Language. At the time of the conquest of Gaul by Julius Caesar, the principal dialects spoken by the inhabitants were Celtic (See CELTS). After the conquest these dialects were gradually supplanted by Latin, except in Brittany, where a Celtic dialect still holds its ground. The popular Latin of Gaul of course exhibited considerable differences from the written and classic Latin, and by the seventh or eighth century the literary and the popular languages had come to be quite clearly distinguished. Besides the Celtic words, not very numerous, which were imported into the new speech, Latin was considerably modified by Celtic habits of speech, new sounds being introduced. It was still further modified by the influences introduced with the Teutonic invasions. The half-barbarous conquerors, incapable of mastering the intricacy of Latin inflections, mostly neglected them, using only the simpler forms. They enlarged the vocabulary also by a number of words, mostly terms of war and hunting. After the Franks in Gaul had abandoned their native language and adopted this new Romanic, or Romance, tongue it became known as the *Francisca*, later *Franceis*, from which the modern term *French* is derived. The

oldest known monument of the new dialect is the oath of Louis the German, taken at Strassburg in 842.

In the ninth and tenth centuries two main branches or groups of dialects came to be recognized, the *langue d'oc*, spoken in the districts south of the Loire, and the *langue d'oïl*, spoken in a variety of dialects in the provinces of the north and east. The names were derived from *oc* and *oïl*, the words meaning *yes* in the two districts. *Langue d'oc* may be said to have reached its height in the Provençal poetry and dialect, known especially in connection with the Troubadours. In the thirteenth century the political superiority of the north brought about the decline of the *langue d'oc*, and a dialect of the *langue d'oïl*, spoken in the central province of Ile de France, where the capital, Paris, was, came to be regarded as the classical language of the country, all other dialects being used only by the ignorant classes. At the beginning of the sixteenth century Francis I prohibited the use of Latin at court and in the public tribunals and formally recognized French as the national language. As one of the Romance languages, it is a sister tongue of Italian, Spanish and Portuguese. See LATIN LANGUAGE; PHILOLOGY.

French Lit'érature. See LITERATURE, subhead *French Literature*.

French Revolution, THE, the great revolution in France at the end of the eighteenth century. The term in this article is understood to mean the years between the outbreak of the struggle in 1789 and the overthrow of the Directory by Napoleon in 1799. For the causes which led up to the struggle, see FRANCE, subhead *History*.

The summoning of the States-General in 1789 was virtually an abandonment of the principle of absolute monarchy in France. The first question which this body was forced to settle was that of the method of voting. The old method had been by class rather than by poll, but if this were pursued, it would mean that the nobles and clergy together could counteract the efforts of the third estate for reform. The nobles and clergy proved firm in their refusal to vote by head, and the third estate withdrew in June, 1789, and declared itself the National Assembly of France. Later, this body was joined by many of the nobles and clergy, and assumed the name of the Constituent Assembly. It voted to adopt a constitution before adjourning and declared the inviolability of its members. The dismissal of Necker, the popular minister, a step to which

Louis XVI was led by his desire to offset the measures of the Assembly, brought about the first open insurrection of the people—the storming of the Bastille. The Assembly next declared all feudal rights and privileges abolished; the National Guard was organized, and the nobles who were unwilling to accept the Revolution left France. In October of the same year a mob, composed largely of women, rushed to Versailles, put to death the royal guard and forced the king and queen to return with them to Paris. The Constituent Assembly also removed to Paris and there continued to work on the new constitution, which was ready in July, 1790. The king's oath to support the constitution was regarded by the people with suspicion, and this suspicion was increased by the constant attempts of the émigrés to gain assistance from foreign powers against the revolution (See EMIGRÉS). In June, 1791, the king and queen tried to escape from France, but were captured and brought back to Paris, where Louis was made to take oath on a revised constitution. The Constituent Assembly dissolved itself in September, 1791, and was followed by the Legislative Assembly.

In 1792, when peace was especially needed in France, war was begun with Austria and Prussia, and the early defeats of the French forces were the cause of risings of the mob in Paris. A rioting band broke into the Tuilleries in August, killed the king's guard and forced Louis to throw himself on the mercy of the Legislative Assembly. The mob then forced the Assembly to imprison the king in the Temple and to declare him suspended from his royal office. In September, 1792, as a result of further reports of French defeats, serious riots broke out in Paris, and hundreds of the inmates of the prisons were murdered. The Battle of Valmy, in which the French were victorious, served to quiet the disorder in Paris for a time. The success in war was continued under the National Convention, which assembled September 20, 1792. Savoy was invaded, Belgium was conquered and Dumouriez defeated the Austrians at Jemmapes. Meanwhile, however, France had been declared a republic by the National Convention, and the announcement was now made that Belgium and Savoy were to be annexed to France. This brought forward new enemies for France, and these enemies were strengthened in their opposition to the revolutionary movement by the execution of the king.

The Convention was rent by the strife of two

parties, the Jacobins and the Girondists. The latter at first had the majority, but their very unpractical character made them unfit to manage affairs at so critical a time, and the radical Jacobins before long gained control. They brought the king to trial in December, 1792, and he was condemned to death and executed January 21 of the following year. In June of that year the Jacobins were strong enough to arrest and put to death the leaders of the Girondists, and they thus held matters entirely in their own hands. The French armies were now meeting defeat at the hands of Great Britain, the Netherlands and Spain, and the results were the same as they had been earlier.

France was now controlled by a Committee of Public Safety, which consisted of a number of the most radical members of the Convention, under the leadership of Danton. The Reign of Terror began with the installation of that body. Among the first who fell under the suspicion of the government were Philippe Egalité, who had renounced his rank and had early identified himself with the Revolution; Marie Antoinette, and Madame Roland. They were given mock trials and sent to the guillotine. Gradually one man began to stand out supreme—Robespierre. First, with the help of Danton, he overthrew Hébert and his party and sent them to the guillotine and then turned upon Danton and his followers, who had ventured to suggest that the Terror was passing beyond all bounds, and had them put to death. Robespierre's own turn soon came, however, and in July, 1794, he himself was beheaded (See TERROR, REIGN OF).

The more moderate members of the Convention, who had been expelled earlier, were now brought back, and in 1795, by a new constitution, the government was placed in the hands of a Directory of five persons and two legislative bodies, the Council of Ancients and the Council of Five Hundred. When an attempt was made to enforce this constitution, an insurrection in Paris was the result, and it was in suppressing this insurrection that Napoleon Bonaparte first became really prominent. Napoleon, in command of the French army in Italy, won some brilliant successes, and it seemed as if the good fortune which had attended the Convention in its latter days would continue under the Directory. Such, however, was not the case. The Austrians, while Bonaparte was absent in Egypt, invaded Italy and several times defeated the French. With the internal conditions under the Directory, also, there was great dissatisfaction.

The financial difficulties could not be met; it was perceived on all sides that the government was generally weak and inefficient, and there were threats of a royalist reaction. The one desire of France now seemed to be for a strong central government, and Napoleon, still absent in Egypt, perceived that his opportunity had come. He returned to France in October, 1799, and three weeks later overthrew the Directory and put himself at the head of affairs.

For the further course of the Revolution, see NAPOLEON I. See, also, articles on men mentioned above, and MARAT, JEAN PAUL; MIRABEAU, GABRIEL HONORE RIQUETTI.

French Somaliland, *so mah'le land*, a French possession in northeast Africa, bounded on the w. by Abyssinia, on the s. and s. e. by Abyssinia and British Somaliland, on the e. by the Gulf of Aden and on the n. by Arabia, the Red Sea and Erythrea. The protectorate covers an area of almost 45,000 square miles. The interior is a plateau, having an elevation of about 4000 feet. There are no industries of note, but the trade is of some importance, owing to the sea fisheries. The chief imports are cotton and silk goods, food stuffs and tobacco, and the exports include coffee, ivory and gold, most of which are sent to France. The principal towns are Jibouti, the seat of the colonial administration; Obok; Tajurah, and Ambado. The government of the country is in the hands of the governor and a general council of six members, three being chosen from the government officials and three from the residents. The population of the protectorate is 22,000, and with the dependencies it is estimated at 200,000.

Frechtown, BATTLE OF. See RAISIN RIVER, MASSACRE OF.

French West Africa, a governor-generalship of France, including practically all of the Sahara, according to the decree of Oct. 17, 1899. It also comprises Senegal, the three military territories of French Sudan, French Guinea, the Ivory Coast and South Dahomey. Saint Louis, in Senegal, is the seat of the governor-general.

Freneau, *fre no'*, PHILIP (1752-1832), an American poet. At Princeton he was acquainted with James Madison. Captured by a British cruiser in 1780, he gave in *The British Prison Ship*, a long poem, an account of his experiences in captivity. As editor of the *National Gazette*, his violent attacks on the Federalists aroused Hamilton's anger. His poems were numerous and comprise, among many satires, some beautiful lyrics, which show Freneau to have been a true poet.

Frere, *frair*, HENRY BARTLE EDWARD, Sir (1815-1884), a British diplomat. In 1834 he entered the Indian service and by 1860 had risen to the position of chief commissioner of Sindh. In 1862 he was made governor of Bombay; ten years later he was sent to East Africa as special commissioner and distinguished himself by procuring from the sultan of Zanzibar a promise to abolish the slave trade. For three years following 1877 he was governor of Cape Colony.

Fres'co or **Fresco Painting**, a method of mural painting in water colors on fresh or wet grounds of lime or gypsum. Mineral or earthy pigments are employed, which resist the chemical action of lime. In producing fresco paintings, a finished drawing on paper, called a cartoon, exactly the size of the intended picture, is first made, to serve as a model. The artist then has a limited portion of the wall covered over with a fine sort of plaster, and upon this he traces from his cartoon the part of the design suited for the space. As it is necessary to the success and permanency of his work that the colors should be applied while the plaster is yet damp, no more of the surface is plastered at one time than the artist can finish in one day. A portion of the picture once commenced needs to be completely finished before leaving it, as fresco does not admit of retouching after the plaster has become dry. On completing a day's work, the artist removes any unpainted part of the plaster, cutting it neatly along the outline or other definite form, so that the joining of the plaster for the next day's work may be concealed. The art is very ancient, specimens of it being found in India, Egypt, Mexico, Pompeii and other places. After the beginning of the fifteenth century fresco painting became the favorite method of the greatest Italian masters, and many of the great works of such artists as Michelangelo, Raphael and Fra Angelico are frescoes on the walls of palaces and churches. Some ancient wall paintings are executed in what is called *dry fresco*, or *tempera*, which is different from the true fresco in that it is executed on dry plaster, which is moistened with lime water before the colors are applied. Fresco painting has in recent years again been revived.

Fres'no, CAL., the county-seat of Fresno co., 207 mi. s. e. of San Francisco, on the Southern Pacific and the Atchison, Topeka & Santa Fé railroads. The city is in an agricultural and stock-raising district. It exports enormous quantities of raisins, wines, brandies, grapes, oranges, olives and other fruits, also wheat, sheep and

Frey

horses. Fresno has a Carnegie library and a fine Federal building. The place was settled in 1872 and became the county-seat two years later. Population in 1910, 24,892.

Frey, *fri*, in Scandinavian mythology, the god of sunshine, of pleasure and of fruitfulness. The other gods, by whom Frey was much beloved, made him various presents, among which was a magic sword, which would fight by itself the moment it was drawn from its scabbard; a ship which, while it was large enough to carry all of the gods and their attendants, could be folded up at will like a napkin; and a boar with golden bristles, on which Frey rode over land and sea with incredible swiftness. Frey fell in love with Gerda, and to obtain the assistance of his servant in gaining Gerda as his wife he was obliged to give up his wonderful sword, which was greatly missed afterwards in all combats of the gods.

Freja, *fri'ah*, in Scandinavian mythology, the sister of Frey and the goddess of love and beauty, corresponding to the Venus of the Greeks and the Romans. The conception of her differs somewhat from the classical conception of Venus, as she was regarded to some extent as a war goddess and often accompanied the valkyries when they flew down to the battlefields to carry away the slain warriors. Half of the heroes slain belonged to Freya, and she entertained them sumptuously in her palace.

Freycinet, *fra se nay'*, CHARLES LOUIS DE SAULCES DE (1828-), a French statesman. He served ably in various positions under the government before his appointment in 1870 as associate to Gambetta in the department of war. After serving as minister of public works, he became premier under President Grévy, but held office less than a year. In 1882 he again formed a cabinet, which remained in office, however, only a few months. In 1886 he was premier a third time, from 1888 to 1893 was minister of war and from 1890 to 1892 was premier for the fourth time. Later he held various offices and was made a member of the French Academy.

Freytag, *fri'tahK*, GUSTAV (1816-1895), a German dramatist and novelist. He is best known in this country for an excellent novel, called in its translation *Debit and Credit*, and for his *Technique of the Drama*. His other works, however, are numerous, and most of them have been highly successful.

Fri'ar. See MONACHISM.

Friction, in mechanics, the resistance offered to the movement of one body by another, when

Frigate Bird

their surfaces are in contact. Friction is due to adhesion and to the roughness of the surfaces. It is of two kinds, *sliding* and *rolling*. The first is illustrated by the sliding of a sled or the working of a piston in a pump or engine; the second by the friction of car wheels on a track. When the pressure is equal, friction is greater between rough surfaces than smooth ones. It is usually greater between soft than between hard surfaces, as the friction of oak on oak is greater than that of iron on iron. Friction is lessened by the use of lubricants, such as oil and graphite. These fill up the cavities in the surface and make it smoother, and they also prevent heat. It is for the purpose of relieving friction that oil is used about machinery.

Friday, the sixth day of the week, the Mohammedan Sabbath, or day of assembly. In the Roman, Anglican and Greek churches Fridays are considered days of general fasts or obligation.

Friendly Islands. See TONGA ISLANDS.

Friendly Societies. See FRATERNAL SOCIETIES.

Friends, SOCIETY OF. See QUAKERS.

Frig'ate, among ships of war of the older class, a vessel of a size larger than a sloop or a brig and less than a ship of the line; usually carrying her guns on the main deck and on a raised quarter-deck and forecastle, or having two decks. Such ships were often fast sailers and were much employed as cruisers in the great wars of the eighteenth century and early part of the nineteenth. Since the introduction of iron-clad vessels, the term frigate has been applied to war ships having a high speed and great fighting power.

Frigate Bird or **Man-of-war Bird**, a tropical web-footed bird, related to the pelican. It



FRIGATE BIRD

takes its name from the savage attacks it makes upon gulls and other birds, when they are carrying their prey. In flight the frigate bird is power-

ful and graceful, and its prey is taken upon the wing. It nests in large colonies on rocky cliffs or in low shrubs or trees. In the breeding season the pouch under the male's bill becomes a bright scarlet, and as he fills this with air from time to time, it puffs out round and full and reaches to the tip of his beak, which is about five inches long.

Frig'ga or **Frigg**, in northern mythology, the wife of the god Odin and the highest of the goddesses, corresponding in some respects to Juno in classical mythology. She is often confounded with Freya, who, however, is more like Venus. It is probable that Friday was named for Frigga.

Fringe Tree, a small tree belonging to the same natural family as the olive, and having snow-white flowers, which hang down like a fringe. It is native to America and Asia. The common fringe tree of America is frequently cultivated in gardens as an ornamental plant and grows to a height of eight feet. Four other species are known, two of which inhabit the West Indies, the third, Ceylon, and the fourth, Australia.

Frith, **WILLIAM POWELL** (1819-1909), an English painter, born at Studley, near Ripon. He was commissioned by the queen to paint the marriage scene of the Prince of Wales. In 1852 he was elected a member of the Royal Academy and afterward was made a member of several foreign academies. Large engravings have been produced from a number of his pictures. Some of his pictures are *Malvolio Before the Countess Olivia*, *Village Pastor*, *Marriage of the Prince of Wales* and *Derby Day*.

Fro'bel, **FRIEDRICH WILHELM AUGUST**. See **FROEBEL**, **FRIEDRICH WILHELM AUGUST**.

Fro'bishier, **MARTIN**, Sir (1535-1594), one of the greatest Elizabethan navigators. He made three expeditions to the Arctic regions, for the purpose of discovering a northwest passage to India, and unsuccessfully attempted to found a settlement north of Hudson Bay. He took part in numerous later expeditions against Spain and was killed in an attack at Brest.

Froebel, *frö'bel*, **FRIEDRICH WILHELM AUGUST** (1782-1852), a German educator, founder of the kindergarten system of instruction. He was the son of a Lutheran minister and during his boyhood and youth obtained only a limited education. He learned forestry, but was not successful and began teaching in a model school at Frankfort-on-the-Main in 1803. Four years later he joined Pestalozzi at Yverdon, where he remained three years studying Pestalozzi's

methods. After this he studied at the universities of Göttingen and Berlin. He enlisted in the volunteer movement against Napoleon, and after that he founded the celebrated school at Keilhau, where he wrought out his system of instruction during the fifteen years that he remained with the institution. Doctor Painter, in his *History of Education*, summarizes the fundamental ideas of Froebel's system as follows:

"1. The task of education is to assist natural development towards its end. As the child's development begins with its first breath, so must its education also.

"2. As the beginning gives a bias to the whole after-development, so the early beginnings of education are of most importance.

"3. The spiritual and physical development do not go on separately in childhood, but the two are closely bound up with each other.

"4. Early education must deal directly with the physical development and influence the spiritual development through the exercise of the senses.

"5. The right mode of procedure in the exercise of these organs is indicated by nature in the utterances of the child's instincts, and through these alone can a natural basis of education be found.

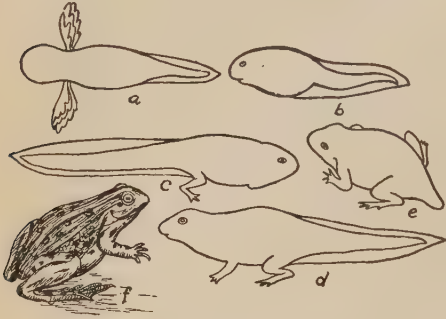
"6. The instincts of the child, as a being destined to become responsible, express not only physical but spiritual wants. Education is to satisfy both.

"7. The development of the limbs by means of movement is the first that takes place and therefore claims our first attention.

"8. Physical impressions at the beginning of life are the only possible medium for awakening the child's soul. These impressions should therefore be regulated as systematically as the care of the body and should not be left to chance." See **KINDERGARTEN**.

Frog, a little tailless animal, common in all parts of the world except Australia and South America. There are many species, and they inhabit widely different regions, but usually prefer swampy places and the shores of lakes and streams. The young frog, which is known as the tadpole, has no resemblance to the parent. It has neither mouth nor limbs, but has branching gills and a long tail, with which it swims about. Its body looks like a roundish lump of dark jelly. But soon the mouth develops, the gills disappear and, as the days go on, the hind legs appear. The fore legs follow, the tail is gradually absorbed and thus the animal changes,

or develops, into the frog. It is an interesting transformation which any one may observe, if he will keep a few of the tadpoles where he can see them daily. The mature frogs breathe by lungs and cannot live in water without coming to the surface for air. They swim with great rapidity and move by long leaps, being able to



DEVELOPMENT OF A FROG

a, b, c, d, e and *f* show the successive stages of development.

jump many times their own length. In the tadpole stage, frogs live chiefly on vegetable matter, but the mature frog lives on insects, slugs, snails and the like. The flesh, especially that of the hind legs of certain species, is considered very choice food, and in France, particularly, frogs are bred for the market in large numbers.

Frohman, CHARLES (1860–), an American theatrical manager, born at Sandusky. He was educated in the public schools of New York City, but soon became interested in the production of plays. His first success was the management of *Shenandoah*, the rights of which he bought after seeing the presentation of the play at Boston. Afterward he organized a stock company and gained control of the Empire theater, the Criterion, the Museum, the Garrick, the Savoy, the Madison Square, the Knickerbocker and the Garden theater in New York City, besides the Duke of York theater in London. He is a prominent figure in the so-called theatrical trust of the United States, which controls the services of some of the foremost actors of the time. He has been instrumental in bringing forward many well-known American actors, among whom are Maude Adams, Julia Marlowe and John Drew.

Froissart, *frwah sahr'*, JEAN (about 1338–about 1410), French poet and historian. He received a liberal education and took orders in the Church, but his inclination was always toward poetry and tales of chivalry. From 1361

to 1366 he was secretary to Philippa, queen of England, whose favor he had won by his poetry. After the death of Philippa he became curé of Lestinnes, and during his quiet life there he worked at his *Chronicles*. After many uneventful years, he again began his travels and journeyed to many parts of the world, visiting famous men and receiving their accounts of wars and expeditions in which they had engaged. Little is known of the closing part of his life. His great work is the *Chronicles*, in the four books of which he told in a vivid manner of the wars and other events of the fourteenth century.

Fronde, *fröhNd*, the name given to a struggle which took place in France between 1648 and 1653. It was directed against Mazarin and consisted of two distinct movements, the first, an attempt of the Parlement of Paris to limit the royal authority; the second, an ambitious attempt of the great nobles to gain power. In order to curb the royal authority the Parlement refused to register certain objectionable edicts in regard to taxation, and when Mazarin arrested two members of the Parlement, an insurrection arose which forced the court to agree to demands of the Parlement. By the following year the court party felt strong enough to withdraw the concessions made, and in the war which now broke out, Parlement had the aid of some of the great nobles of the State. The nobles were for the most part successful, but as they had no definite program laid down, they allowed their gains to slip through their fingers, and Mazarin was able to regain his old power.

Frontenac, *fröhNt nak'*, LOUIS DE BAUDE, Comte de (about 1620–1698), a French soldier, one of the early governors of New France in America. He had served with distinction in Italy, Flanders and Germany before he was made governor of New France in 1672. The explorers Joliet, Marquette and La Salle were encouraged by him, and he established a number of strong military posts. Despite the fact that New France prospered under his rule, he was recalled in 1680, but nine years later he was reinstated. During this second administration, he was engaged in a struggle with the Iroquois Indians of New York, whom in 1696 he compelled to sue for peace. During King William's War with the English, he succeeded in forcing the English fleet to retreat from before Quebec in 1690.

Frost, the name given to the state of the weather when the temperature is below the freezing point of water; also the name given

to the moisture condensed from the atmosphere, when the dew point is below 32° F. Frost is often very destructive to vegetation, owing to the fact that water, which is generally the chief constituent of the juices of the plants, expands, when freezing, and bursts, thus destroying the minute cells of the plant. In the same way, rain water, freezing in the crevices of rocks, breaks up their surfaces and often detaches large fragments. Frost is not frozen dew, but vapor frozen as it condenses. It is generally seen most profusely in spring and autumn, because at those times, while, on clear nights, the cold is sufficient to freeze the vapor, the days are at the same time sufficiently warm to cause a very considerable quantity of moisture to evaporate into the air. See Dew.

Frostbite, a term applied to the effect of severe cold on the human body. It is generally local and partial, varying from ordinary chilblain to complete death of the part frozen. The simplest treatment of light frostbite consists in coaxing back the vitality of the part affected by means of gentle rubbing with snow, ice or cold water. The return of blood brings heat and fever, which may be very severe if the return is sudden. Hence, cold applications should be used before warm ones. If the freezing has been very severe or long-continued, the parts may die, decay and slough off. In such cases prompt skilled treatment is necessary.

Frostburg, Md., a town in Allegheny co., 163 mi. s. e. of Pittsburg, Pa., on the Cumberland & Pennsylvania railroad. It has a picturesque location 2200 feet above the level of the sea and has become a popular summer resort. Coal mining is the chief occupation, and there are also large foundries, planing mills and fire-brick yards. Population in 1910, 6028.

Froude, *frood*, JAMES ANTHONY (1818-1894), an English historian and miscellaneous writer. He was educated at Westminster School and at Oxford and after his graduation became engaged in the Tractarian movement (See TRACTARIANISM), as advocated by Newman. He even took orders in the Church, but resigned before long and gave himself up to historical study. Between the years 1856 and 1869 appeared his great work, *The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada*, which was very popular, but received only doubtful approval from historians. He was elected rector of Saint Andrews University in 1869, traveled in the United States in 1872 and aroused considerable opposition by his

lectures on the Irish question. Later he traveled in South Africa, Australia and the West Indies and gave accounts of his journey in lectures and books. Carlyle appointed Froude his literary executor, and after Carlyle's death Froude published *The Reminiscences of Carlyle*, *Letters and Memorials of Jane Welsh Carlyle* and *Thomas Carlyle: a History*. These provoked an extraordinary amount of interest and controversy, because of the unreserved accounts they gave of the life of the Carlyles. Among Froude's other works are *The English in Ireland in the Eighteenth Century*, *Life of Lord Beaconsfield* and *Life and Letters of Erasmus*.

Fruits, *fruits*, in botany, the mature ovary, composed of the seed of a plant and its coverings. In a more general sense, the term is applied to the edible products of certain plants, generally covering and including their seeds. On the accompanying color plate may be seen a number of the familiar fruits of the United States, all but three of which, the loquat, the orange and the lemon, are raised more extensively in the more temperate parts of the country. These, together with the banana and some other subtropical fruits, are raised in abundance in California and Florida. The value of these products in the United States is constantly increasing, and fruit raising is in many sections of the country the most important industry. The really valuable fruits of the United States are described under their appropriate titles elsewhere in the work.

Fry, ELIZABETH GURNEY (1780-1845), an English reformer. She joined the Society of Friends and in 1811 began preaching. Her great public work began in 1817, with the formation of the society for the improvement of women prisoners in Newgate. Largely through her exertions the condition of these prisoners was greatly improved. She visited the prisons of Scotland and northern England and founded several prison associations. The House of Commons took official notice of her work, commending it in the highest terms.

Frye, WILLIAM PIERCE (1831-1911), an American lawyer and statesman, born at Lewiston, Me., and educated at Bowdoin College. He entered the legal profession and was also a member of the state legislature in 1861-1862 and again in 1867. Meantime, he served as mayor of the city. He was attorney-general of the state (1867-1869), was chosen to Congress for six terms and was elected senator to take the place of James G. Blaine in 1881. In 1898 he

was appointed by President McKinley one of the five commissioners to negotiate the treaty of peace with Spain. After the death of President McKinley and the consequent accession of the vice-president to the presidency, Mr. Frye filled the position of president *pro tempore* of the Senate.

Fuca, Juan de, joo'kah, wahn da, STRAIT OF, the strait between Vancouver Island and Washington, on the Pacific coast. It connects the Pacific Ocean with the Strait of Georgia on the north and Puget Sound on the south. Its length is 100 miles and its width 15 miles in the western part and 30 in the east.

Fu-chow or Foo-chow, a city of China, capital of the province of Fokien, on the Min River, 125 mi. n. e. of Amoy. A long bridge, called the "Bridge of Ten Thousand Ages," crosses the river here. It is one of the five ports thrown open by the treaty of 1843. The trade is very extensive, but the navigation of the river from the sea to the harbor is difficult. Fu-chow has a large arsenal, government shipyards and dry dock. Among the manufactures are cotton goods, matches and lacquer ware. Population, estimated at 700,000.

Fuchsia, fu'she ah, a genus of beautiful flowering shrubs, named after the discoverer, Leonard Fuchs, a German botanist. There are about fifty species, natives of South America, Mexico and New Zealand. The plant bears beautiful flowers that droop gracefully from the branches. Fuchsias are often called *ladies' ear-drops* and are a popular garden plant in the United States and Europe.

Fuel, a substance used for feeding fire. Fuels are divided into three classes, solids, liquids and gases. The most important solid fuels are coal, coke, charcoal and wood. In the United States and Great Britain coal and coke are the most extensively used, but in countries having large forests, wood is the common fuel. The liquid fuels are petroleum, kerosene, gasoline, various oils and alcohol. Peat is also used as a fuel to some extent in countries where it is formed, particularly in Ireland. Wood charcoal is another kind of fuel which is extensively used in metallurgy, chemistry and various industrial arts. It kindles quickly, emits few watery or other vapors while burning and, when consumed, leaves few ashes. These, being light, are easily blown away, so that the fire continues open to the current of air which must pass through it to keep it burning. This sort of fuel, too, is capable of pro-

ducing as intense a heat as can be obtained by any; but in violent heats it is quickly consumed and needs to be frequently supplied. Coke or pit-coal, charred, is a fuel which possesses in many respects the same properties as charcoal of wood. It is employed for producing intense melting heats. Various kinds of artificial fuel are manufactured. These are composed of different ingredients, of which coal slack, or dust, is the most important. The coal dust is mixed with some adhesive substance, such as clay, lime or coal tar, and is compressed into bricks, called *briquettes*. Coal slack has also been employed as fuel in an entirely different mode. It is ground as fine as possible and blown into the furnace, where it burns much in the same way as the spray of liquid fuel. See CHARCOAL; COAL; COKE; NATURAL GAS; PEAT; PETROLEUM.

Fugitive Slave Laws, in United States history, two statutes providing for the return of slaves who had escaped from one state to another. Most of the colonies had laws guaranteeing the return of fugitive slaves. The Ordinance of 1787 contained a clause to that effect, and the Constitution specified that slaves escaping into a free state should be delivered to their owners. Congress in 1793 passed an act allowing the owner of a slave, by making an affidavit before a Federal judge, to secure a warrant for his arrest and removal. The slave could not testify in his own behalf. The abuses of this law led to a demand on the part of Northerners for an amendment requiring more evidence for the granting of a warrant, and this led to the passage of personal liberty laws by many Northern states, forbidding state officials to help in reclaiming alleged fugitives. These laws were declared constitutional by the Supreme Court. In 1850, among the compromise measures passed (See COMPROMISE OF 1850) was a fugitive slave law, placing in the hands of Federal officials the whole process of reclaiming fugitive slaves, adding many officials to the service, inflicting severe penalties for violation and declaring bystanders who refused to assist a government official guilty of treason. The owner's oath was sufficient evidence, and he could take this oath before a court in his own state. The passage of this law was one of the most important incidents in the slavery controversy which led to the Civil War.

Fujiyama, foo'je yah'mah, or Fusiuyama, a dormant volcano, of a cone-like shape, in the island of Hondo, Japan, 60 mi. w. of Tokyo.

Fulah

It is the highest summit in Japan, measuring 12,400 feet, and is the sacred mountain of the people. It has been quiescent since 1707. It is visible in clear weather for nearly a hundred miles.

Fulah, *foo'lah*, a remarkable African race, of the negro type, now widely diffused throughout the Sudan, where they are the predominant people in many provinces. Though of the negro family, they have neither the deep jet color, the crisped hair, flat nose nor thick lips of the negro, but are decidedly handsome and generally of a light copper color. They are shrewd, intelligent and brave and are chiefly Mohammedans. Their name appears in various forms in different tribes.

Ful'gurite, any rocky substance which has been fused or made into an impure glass by lightning. More strictly, a vitrified tube of sand, formed by lightning, whose intense heat has penetrated the sand and fused the portion of the materials through which it passes.

Full'er, MARGARET. See OSSOLI, SARAH MARGARET FULLER.

Fuller, MELVILLE WESTON (1833-1910), an American jurist, born in Augusta, Me. At the age of twenty he graduated at Bowdoin College. He studied law at Harvard and was admitted to the bar in his native city in 1855. He became editor of the *Augusta Age*, but in 1856 moved to Chicago, where he practiced law for thirty-two years. In 1862 he was a member of the Illinois constitutional convention, and the following year he was elected to the state legislature. He was a member of the Democratic national conventions from 1864 to 1880, inclusive, but withdrew from active politics in the latter year. On April 30, 1888, he was nominated chief justice of the United States Supreme Court by President Cleveland and served twenty-two years with dignity and ability. In 1899 he was one of the arbitrators of the Anglo-Venezuelan dispute.

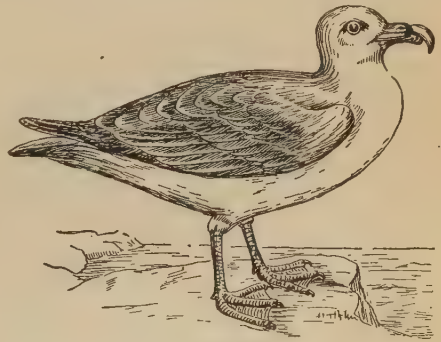
Fuller, THOMAS (1608-1661), an eminent historian and divine of the Church of England. Several of his writings are English classics, remarkable for quaintness of style, wit, sagacity and learning. Among the more important are *History of the Holy War*, *Church History of Britain* and the *Worthies of England*, a production valuable alike for the solid information it affords, relative to the provincial history of the country, and for the profusion of biographical anecdote and acute observation on men and manners.

Fulmination

Fuller's Earth, a variety of clay or marl, compact but friable, soapy to the touch and of various colors, usually with a shade of green. It is useful in scouring and cleansing cloth, as it absorbs the grease and oil used in preparing wool. It is composed of silica, alumina, magnesia, lime and water.

Fulling Mill, a mill for fulling cloth by means of pestles, or stampers, which beat or press it to a close or compact state and at the same time cleanse it by the use of fuller's earth and soap. The principal parts of a fulling mill are the wheel, the spindle, the pestles, or stampers, and the trough. The spindle contains teeth, which, as the spindle is revolved, communicate the motion to the pestles, or stampers. The cloth is placed in the trough with fuller's earth and soap and water.

Ful'mar, the name of several species of petrels. The common northern fulmar inhabits the northern seas and is found plentifully on the shores of the Faroe Islands, Iceland and



FULMAR

Greenland, on the southern shores of Great Britain and around Saint Kilda. It is about the size of a duck, is gray above and white beneath, with snow-white head, neck and tail. The birds are especially valuable for their feathers and also for their oil, which forms an important commercial product. Fulmars are caught by hunters, who make perilous descents by ropes from the summit of precipices. The giant fulmar, remarkable for its size, is found in the Pacific Ocean. Another species, the slender-billed fulmar, is found on the Alaskan coast of Bering Sea. See PETREL.

Fulmina'tion, a term used in chemistry to denote the explosion of a substance by heat or percussion. Fulminating compounds, or fulminates, are explosive compounds of fulminic acid with various bases, such as gold, mercury, platinum and silver. The old fulminating pow-

Fulton

der is a mixture of sulphur, niter and potash. Fulminate of mercury forms the priming of percussion caps.

Fulton, *full'ton*, N. Y., a city in Oswego co., 25 mi. n. w. of Syracuse, on the Oswego River, the Oswego Canal and the New York Central, the Lackawanna and other railroads. It has a large cheese trade and considerable manufactures of paper, woolens, flour, machinery and other articles. It was settled about 1791. Population in 1910, 10,480.

Fulton, **ROBERT** (1765-1815), an American engineer, born at Little Britain, Pa., who claimed to be the introducer of steam navigation on American waters. He adopted the profession



ROBERT FULTON

of portrait and landscape painter and in his twenty-second year proceeded to England for the purpose of studying art under West. There he became acquainted with the duke of Bridgewater, Earl Stanhope and James Watt and was led to devote himself to mechanical engineering. In 1794 he took a patent for a double-inclined plane, which was intended to supersede locks on canals, and he also patented a mill for sawing marble, machines for spinning flax and making ropes, and a dredging machine. In 1797 he went to Paris, where he produced the first panorama that was exhibited there. He also, after some trials, was successful in intro-

Fungi

ducing a boat propelled by steam upon the Seine. His chief occupation in Paris was the invention of torpedoes for naval warfare. During a visit to Scotland he had seen and obtained drawings of the *Charlotte Dundas*, a steam vessel which had plied with success on the Forth and Clyde Canal. He returned to America in 1806 and built a steamboat, the *Clermont*, of considerable dimensions, which began to navigate the Hudson River in 1807. Its progress through the water at the time was five miles an hour. His reputation as an engineer and inventor was now firmly established, and he was employed by the United States government on various engineering works. In 1814 he constructed the first war steamship and was engaged upon an improvement of his submarine torpedo when he died. See STEAM-BOAT.

Funchal, *fooN shahl'*, the capital of the island of Madeira, situated on a bay on the south coast. It stretches for nearly a mile along the shore and presents a thoroughly European appearance. It is a coaling station for steamers and is visited by invalids afflicted with pulmonary complaints. Population, about 19,000.

Function, in mathematics, a quantity so connected with another that no change can be made in the latter without producing a corresponding change in the former, in which case the dependent quantity is said to be a *function* of the other; thus, the circumference of a circle is a *function* of the diameter, the area of a triangle is a *function* of any two of the sides and the angle they contain.

Fundy, **BAY OF**, a large inlet of the Atlantic, on the east coast of North America, separating Nova Scotia from New Brunswick. It is about 100 miles long and 30 to 50 miles wide. At its inner extremity it divides into Chignecto Bay and Minas Channel and Basin, with smaller continuations. It is noted for its impetuous tides, which cause a rise and fall of from 12 to 70 feet and make navigation dangerous. At its entrance are Grand Manan and other islands. This bay receives the Saint John and Saint Croix rivers.

Fungi, *fun'ji*, a general name for those flowerless plants that have no chlorophyll in their tissues and hence are unable to live independently, but must prey upon other plants or animals. The number of different species is enormous. Perhaps 50,000 have been described, and it is probable that this is not more than



FUR-BEARING ANIMALS OF NORTH AMERICA

1, Brown Bear
2, Squirrel

3, Lynx
4, Sable

5, Seal
6, Ermine

7, Otter
8, Beaver

9, Silver Fox
10, Mink

one-third of the entire number. They grow wherever they can find organic matter on which to subsist and are to be found floating in the air at all times, living in exposed water and inhabiting the soil everywhere. Some species are beneficial to man, but others are intensely destructive. See BACTERIA AND BACTERIOLOGY; RUSTS; MILDEWS; YEASTS; MUSHROOMS.

Fungicides, *fun'jy sidez*. See INSECTICIDES.

Funs'ton, FREDERICK (1865–), an American soldier, born in Ohio. He graduated from the high school at Iola, Kan., and after teaching a short time entered the state university at Lawrence. He made important researches in botany and was appointed in 1895 as a commissioner to explore Alaska and report on the flora of the country. In 1896 he took part with the insurgents in Cuba under General Garcia. When the Spanish War began, he became colonel of the Twentieth Kansas volunteers and was ordered to Manila. He was made brigadier general of volunteers for bravery. In March, 1901, he led a party into northern Luzon and captured Aguinaldo, the leader of the insurgents. For this achievement President McKinley made him a brigadier general in the regular army. At the time of the San Francisco earthquake and fire in April, 1906, he had charge of the military forces in the city and displayed great energy and foresight. In 1914 he was in command of the United States troops at Vera Cruz, Mexico, and later in the same year was promoted to the rank of major-general.

Fur and Fur Trade. Fur is the fine, soft hair covering of certain animals, especially the winter covering of animals belonging to northern latitudes. The animals chiefly sought after for the sake of their furs are the otter, seal, beaver, marten, ermine, muskrat, mink, lynx, fox, bear and wolf (see *color plate* opposite). All the preparation that skins require before being sent to the market is a thorough drying, so that they will not spoil. The small skins, however, are sometimes steeped in a solution of alum before drying. When stored in large quantities they must be carefully preserved from dampness, as well as from moths. The furdresser, on receiving the skins, softens them, scrapes off the pieces of flesh that may remain, and cleans them thoroughly. Then, after the fur has been combed, the skin is ready for the cutter.

* Russia yields great quantities of furs, especially in the Asiatic portion of her dominions.

Austria, Turkey and Scandinavia produce the greater part of the balance of European furs. The fur trade of America has long been highly important and has given rise to several great trading companies. The French early took up the fur trade in Canada, and their chain of forts and trading posts at one time extended from Hudson Bay to New Orleans. Quebec and Montreal were at first trading posts. In 1670 Charles II granted to Prince Rupert and others a charter empowering them exclusively to trade with the Indians of the Hudson Bay region. A company, then and after called the Hudson's Bay Company, was formed, which for a period of nearly two centuries possessed a monopoly of the fur trade in the vast tract of country known as the Hudson Bay Territory. In the winter of 1783-1784 another company was formed at Montreal, called the Northwest Fur Company, which disputed the right of the Hudson's Bay Company and actively opposed it. After a long and bitter rivalry the two companies united in 1821, retaining the name of Hudson's Bay Company. The monopoly which had hitherto been enjoyed by the original company about Hudson Bay was not much extended; but in 1868 an act of Parliament was passed to make provision for the surrender, upon certain terms, of all the territories belonging to the company and for their incorporation with the Dominion of Canada. In 1869 the surrender was carried out, Canada paying \$1,500,000 to the company by way of compensation. The trade in furs conducted by citizens of the United States has been extensive, but it has been in a greater degree the result of individual enterprise than of the management of gigantic corporations. The Alaska Fur Company holds two of the Aleutian Islands in lease from the government, with the sole right of killing yearly not more than 100,000 fur seals. New York is the most important fur market in the United States, and London and Leipzig are the most important European markets.

Fu'ries, known also as the Eumenides or the Erinyes, in Greek mythology, certain deities who avenged such crimes as murder, perjury or filial ingratitude. It was generally believed that there were three of these goddesses, though Aeschylus in his tragedy of the *Eumenides* introduced many more. These terrible sisters pursued all criminals who had escaped from the law and drove them mad with remorse. So great was the fear of them that the ancients did not dare speak of them as the Erinyes,

which meant *the angry goddesses*, but used the name Eumenides, *gracious ones*, in order to pacify them.

Fur'long, (furrow-length), an English measure of length, divided into 40 rods, poles or perches, and equal to 220 yards, the eighth part of a mile.

Furnace, a device for maintaining a very hot fire. Furnaces are used for smelting ore, making glass, baking pottery, warming buildings and other purposes. Those employed in smelting have an arrangement by which a strong draft of air is forced through the fire; these furnaces are known as blast furnaces (See BLAST FURNACE). A *reverberatory* furnace is one in which the flames, in passing to the chimney, are thrown down by a low arched roof upon the object which it is intended to heat. These furnaces are used in the manufacture of wrought iron and steel (See IRON). The ordinary furnace used for warming buildings is practically a large stove, enclosed in a jacket. The air is admitted to the jacket near the ground, and as it rises is warmed by coming in contact with the furnace. It passes out through pipes at the top and is conveyed to different parts of the building. See HEATING; VENTILATION.

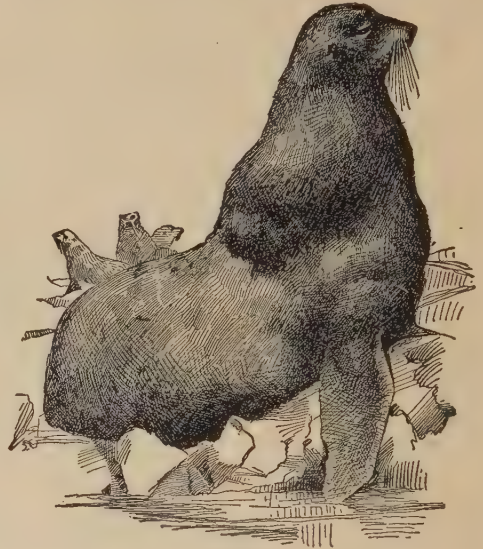
Furieux, *fur no'*, Islands, a group of Australasia, at the east end of Bass Strait, including Flinders Island, the largest, 35 miles long and 10 miles wide; Cape Barren Island, Clarke, Hummock and Babel islands. They were discovered by Furieux in 1773.

Furness, HORACE HOWARD (1833-1912), an American Shakespearean scholar. He was born in Philadelphia and educated at Harvard and at Halle in Germany. After studying law, he was admitted to the bar in 1859. The work for which he is best known is his *Variorum Shakespeare*, which has been universally recognized as an important and scholarly work.

Furnivall, FREDERICK JAMES (1825-1910), an English philologist. He has been mainly instrumental in establishing the Early English Text Society, the Chaucer Society, the New Shakespeare Society, the Browning Society, the Wyclif Society and the Shelley Society. He has edited numerous works, chiefly through the medium of some of these societies, among which is the famous Six-Text edition of Chaucer's *Canterbury Tales*. He has been closely connected with various editions of Shakespeare's plays.

Fur Seal, a species of seal much valued for its fur, which consists of a thick, woolly hair next

the skin, very fine and compact, and usually of a dark brown color. Over this grows long, coarse hair, which is of some shade of gray. The fur seals are found in the waters of the cool temperate or polar regions north and south of the equator, though in the Antarctic regions they are now almost extinct.



FUR SEAL

One herd of seals, which constitutes a distinct species, and that the most important of all the seals, makes its home on the Pribilof Islands, a barren little group in Bering Sea. The study of these animals and their habits, as exhibited on Saint Paul and Saint George, the two largest islands, has been as fascinating to men of science as their capture has been profitable to traders. Every spring the seals return by thousands to this chosen home, and many of them have specially favored places which they seize each year, and for which they will fight to the death. Each old male, or bull, gathers about him a large number of females, sometimes as many as one hundred, whom he defends against the other bulls, and from whom he exacts the strictest obedience. Through all the long period from spring until August the bulls fast, but the mothers, soon after the young seals, or pups, are born, swim away to the south to find food. The little seals are thus left sometimes for a week, but when the mothers return each is able to distinguish her own pup from all the others of the great group. The pup, too, can tell its own mother's voice, though hundreds or thousands of others may be calling at the same time.

When winter comes, and the storms begin, the seals depart for the south, often going down as far as Lower California; but nowhere do they land and establish a home until with the spring they return to the Pribilof Islands.

The full-grown male fur seal is almost as large as a bear, being often twice as long and weighing four or five times as much as the female. It is the young males which are killed for their fur, for they are the least necessary part of the colony, as the old bulls will not allow them to set up families until they are seven or eight years old, at least. The killing of seals on the Pribilof Islands is carefully regulated by the United States government and only a small number may be killed each year; but in spite of care the number has steadily lessened, and in 1910 killing was forbidden for a period of five years. There are other seal breeding grounds, or rookeries, on other groups of islands, but none are as large or as important as the one on the Pribilof Islands.

The animals are killed by clubbing them when they are on land, where they are comparatively helpless. The skins are salted and packed in the holds of vessels until the close of the season. The beautiful fur is seldom seen in its natural state. As usually prepared, the long gray hair is removed by scraping the pelt on the under side until the roots of this hair, which penetrate the skin farther than those of the fine hair, are cut; then by whipping the pelt the long hair is easily removed. The skins are then dyed dark brown or almost black, and in this form constitute the ordinary sealskin of commerce.

Furth, *furt*, a town in Bavaria, 6 mi. w. n. w. of Nuremberg, at the confluence of the Pegnitz with the Rednitz. Its chief buildings are the Church of Saint Michael and a town hall. It has important and varied manufactures, including mirrors, picture frames, jewelry, gold leaf, lead pencils, spectacles and machinery. Population in 1910, 66,553.

Fuse, a tube filled with combustible matter and used in blasting, discharging hollow projectiles and exploding mines. The ordinary fuse used in mining and quarrying is a small tarred cord, containing in its center a small quantity of gunpowder or other very combustible material, so mixed with chemicals that it burns slowly. When the fire reaches the charge of powder, the explosion immediately follows. Fuses used in hollow projectiles explode when the projectile strikes the object against which it was fired. These are known as *concussion* fuses. Such fuses are found in shells and torpedoes. Some patterns of torpedo contain a mechanical fuse, which is timed to produce an explosion at the end of the number of seconds it is estimated it will take the torpedo to reach the object against which it is fired. See **TORPEDO**.

Fu'sel Oil, a heavy, oily, inflammable fluid, with a high boiling point, disagreeable cutting odor and pungent taste, which is separated in the rectification of ordinary alcohol, distilled from grain, malt, potatoes, molasses, beet root and other substances. The composition of fusel oil depends on materials used in the manufacture of the spirit. It acts very harmfully on the body and is often the ingredient which makes inferior kinds of liquor so injurious.

Fusing Point, the degree of temperature at which a substance melts or liquefies. This point is very different for different metals. Thus, potassium fuses at 136° F., bismuth at 504°, lead at 619°, zinc at 680°, silver at 1832°, gold at 2282°. Malleable iron requires the highest heat of a smith's forge, 2912°; while cerium, platinum and some other metals are infusible in the heat of a smith's forge, but are fusible before the oxhydrogen blow pipe and in the electric furnace.

Fusiyama, *foo'se yah'mah*. See **FUJIYAMA**.



G, the seventh letter in the English alphabet. The Roman alphabet originally contained no such character, the hard *c* sound serving where the *g* came to be used later. *G* always has the hard sound, which is its earliest sound, at the beginning of words of English origin, before the vowels *a*, *o* and *u* and at the end of a word. The soft sound, which is identical with that of *j*, is found usually before *e*, *i* and *y*. In form, also, *G* is a modification of *C*.

In music, *G* is the fifth note of the diatonic scale of *C*.

Gabelle, *ga bel'*, a name given in France to a tax upon salt, which was first imposed in 1286 as a temporary import. It was later perpetuated from reign to reign. Salt was made a government monopoly, and every family in France was compelled to buy a certain amount each week, at a price fixed by the government. This price varied among the provinces. The gabelle was extremely unpopular and was finally suppressed by the revolutionary government in 1790.

Gabers, *ga'burz*. See GHEBERS.

Gable, the triangular part of an outside wall at the end of a building, extending from the eaves to the ridge of the roof. In classic architecture it was part of the pediment and was an important feature, but it did not come into general use until the Romanesque period of architecture in the Middle Ages, when it was common in the formation of the summits of church façades. It was also used as a decorative feature in domestic architecture. The development of tracery in Gothic architecture led to the use of highly decorated gables as ornaments over doorways, windows, pinnacles and other parts of buildings. In the towns of Belgium and Germany to-day, ornamental gables are in use in houses to a great extent.

Gabriel, the name given to that one of the archangels whose duty it was to announce to man the will and purpose of God. He appeared to Daniel as the interpreter of a vision, *Daniel*

viii, 7; to Zacharias as the herald of the birth of John the Baptist, *Luke i*, 19, and to Mary as the herald of the birth of Christ, *Luke i*, 26.

Gabun or **Gaboon'**, a river of French Kongo in Western Africa. The name is strictly applied only to a broad estuary through which several small streams discharge their waters into the Atlantic. It is about 40 miles long and is navigable for the largest vessels.

Gad, one of the sons of Jacob, in biblical literature considered to be the father of the tribe of the same name. When the Israelites were about to enter the Promised Land, this tribe was given territory on the east of the Jordan (See *Num.* xxxii). After the conquest of the country, in which the members of the tribe agreed to assist, they returned to the territory assigned and dwelt there for nearly seven hundred years. During this time this tribe, together with others of the Israelites, was involved in numerous wars with surrounding nations, and in 734 it was taken captive by Tiglath-Pileser and extinguished.

Gade, *gah'de*, NIELS WILHELM (1817-1890), a famous Danish musician and composer, born at Copenhagen. He was first compelled to learn the trade of a cabinetmaker under his father's instruction, but soon abandoned it to begin a course of musical study. At the age of sixteen he made his début as a concert violinist. He won numerous prizes for composition and through the aid of the king completed his education at Leipzig, where, in the absence of Mendelssohn, he for a time directed the Gewandhaus concerts and became permanent conductor in 1847. Three years later he returned to Copenhagen, where he became master of the Chapel Royal and director of music. Gade was one of the leading figures in the new romantic movement in music and received the highest honors from leading critics and musicians of his time. Among his compositions the best-known are probably the *Erl King's Daughter*, *The Springtide Fantasy* and *The Crusaders*.

Gadfly

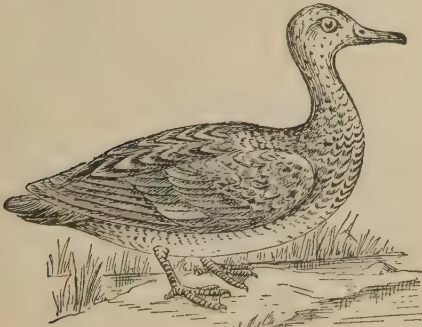
Gadfly, a name that is given to several different species of small flies which are troublesome pests in the woods during the summer months. The common black gadfly, which is found in many parts of the United States, sucks the blood of man and other animals through its sharp proboscis and, if permitted, will lay its eggs in the wound, producing sores.

Gad'sden, ALA., the county-seat of Etowah co., 60 mi. n. e. of Birmingham, on the Coosa River and on the Chattanooga Southern and other railroads. The industries include blast-furnaces and the manufacture of cars, lumber, machinery, doors, sash, blinds and wagons. It was settled about 1845 and incorporated in 1867. Population in 1910, 10,557.

Gadsden Purchase, the name given to a tract of land in the southern part of New Mexico and Arizona, purchased from Mexico by the United States in 1854, through the agency of James Gadsden. It is bounded on the north by the Gila River, on the east by the Rio Grande, on the west by the Colorado and on the south by an arbitrary line. Its average width is about 120 miles, and it includes an area of about 45,535 square miles. The United States paid Mexico \$10,000,000 and made other concessions. The treaty was negotiated in 1853 and was ratified in the following year. It caused such opposition in Mexico that Santa Anna was banished.

Gadski, *gahd'ske*, JOHANNA (TAUSCHER) (1871-), a German operatic singer, born in Prussia and educated at Stettin. She made her debut in New York City. Madame Gadski has sung at several festivals and has been particularly successful in Wagnerian rôles. She has made several concert tours of the United States.

Gad'wall, a rather large fresh-water duck,



GADWALL

common in the interior of the United States and breeding north of Kentucky. It is a black

Gage

and white duck, marked with brown, and is one of the favorite game birds.

Gael, *gale*, the name of a branch of the Celts, inhabiting the Highlands of Scotland, Ireland and the Isle of Man. Gaelic is the name now generally restricted to that dialect of the Celtic language which is spoken in the Highlands of Scotland and is distinguished from Manx and Irish, the other two kindred dialects.

Gaeta, *gah a'tah*, a city and very strong fortress in Italy, situated 74 mi. n. w. of Naples on the Gulf of Gaeta. On the promontory on which the city stands is the Torre d'Orlando, the tomb of Munatius Plancus, the friend of Augustus. It stands 160 feet high and has a diameter of 160 feet. Other objects of interest are the campanile of the Cathedral of Saint Erasmus and the remains of a Roman theater. This city carries on a fairly extensive trade in fish, oil, wine and fruit. It was originally a Greek colony. After resisting the barbarian invaders, it became a part of the Byzantine Empire. In 1134 it was annexed to the Norman kingdom of Sicily. Population in 1911, 5500.

Gage, *gaje*. See GAUGE.

Gage, LYMAN JUDSON (1836-), an American financier, born in New York. He moved to Chicago in 1855 and in 1858 entered the service of the Merchants' Loan & Trust Company. Later he became manager of the clearing house and was elected president of the First National Bank in 1882. He was three times chosen president of the American Bankers' Association, was twice president of the Civic Federation of Chicago, and was the first president of the board of directors of the World's Columbian Exposition. He was secretary of the treasury under President McKinley from 1897 to 1902, and from 1902 to 1906 president of the United States Trust Company of New York.

Gage, THOMAS (1721-1787), an English soldier and colonial governor of Massachusetts, born in Sussex, England. He entered the British army and served in Scotland and Flanders and with Braddock in America. At the outbreak of the last French and Indian War, he was made brigadier general and served at the head of a regiment of colonial troops. He was governor of Montreal in 1760, became major general in the following year and at the end of the war was commander in chief of the British forces in America. In 1768 he was placed at the head of a British force in Boston, but returned to England in 1772. Two years

later he was appointed military governor of Massachusetts and aroused bitter resentment by his vigorous enforcement of the Boston Port Bill and the Navigation acts. It was through his order to the troops to seize the military stores at Concord that the first battle of the Revolutionary War was fought. He commanded the troops at Bunker Hill, but was recalled to England in October, 1775.

Gag Rules, the name given in American history to certain rules passed by the Federal Congress abridging the right of petition. They were the result of the agitation of the northern Abolitionists, who presented petitions to Congress urging the abolition of slavery or steps to that end. John Quincy Adams identified himself with this movement and presented a vast majority of the petitions sent to Congress. In May, 1835, however, the so-called Pinckney Resolutions were adopted, practically providing that such petitions should be disregarded.

Gail Hamilton. See DODGE, MARY ABIGAIL.

Gaines's Mill, BATTLE OF. See PENINSULA CAMPAIGN.

Gainesville, FLA., the county-seat of Alachua co., 75 mi. s. w. of Jacksonville, is on the Atlantic Coast Line and other railroads. It is a center of phosphate mining, truck farming, turpentine distilling and lumbering. It is the seat of the University of Florida and the Florida Agricultural Experiment Station. Population in 1910, 6183.

Gainesville, TEX., the county-seat of Cooke co., 65 mi. n. of Fort Worth, on the Atchison, Topeka & Santa Fé and the Missouri, Kansas & Texas railroads. The city is in an agricultural and stock-raising country and has packing-houses, brickyards, flour and cottonseed oil mills and other factories. It was settled in 1851 and was incorporated in 1873. Population in 1910, 7624.

Gainsborough, *gaynz'b'ro*, THOMAS (1727-1788), an English painter, born at Sudbury, in Suffolk. He was one of the original thirty-six academicians. He rivaled Sir Joshua Reynolds as a portrait painter and showed no less originality in landscape. He painted portraits of Garrick, Mrs. Siddons, Pitt, Blackstone, Burke and many other notable people. One of his most celebrated productions is *Duchess of Devonshire*, which was bought originally for \$305, but sold for more than \$50,000 in 1876. Other paintings are *Boy Blue*, considered his greatest work, *Rustic Children*, *The Cottage Door* and *The Harvest Wagon*.

Gaius, a Roman jurist, the chief source of present knowledge of Roman law prior to the revision of Justinian. His principal work was the *Institutes*, which, with others of his writings, were liberally used and quoted by Justinian in his *Digest of Roman Law*. The facts in the life of Gaius are practically unknown, and his writings were lost until early in the nineteenth century, when German scholars discovered them in secluded libraries.

Galacz, *gah'lahts*. See GALATZ.

Gal'ahad, Sir, in legends of the Holy Grail, the son of Lancelot and Elaine, the purest of the knights of the Round Table and the only one who was permitted to see clearly the Holy Grail.

Gal'apa'gos, a group of 13 islands of volcanic origin, in the North Pacific Ocean, about 600 mi. w. of the coast of Ecuador, to which they belong. The total area is 2400 square miles. The most important are Albemarle, 60 miles long by 15 broad, rising 4700 feet above the sea; Indefatigable, Chatham, Charles, James and Narborough. Turtles are very numerous and form the principal product of the islands. Sugar is grown, and cattle are raised to some extent. The islands were explored by Darwin in 1858, and they have been visited by many naturalists, because of the interesting animal and vegetable life found there. Many forms are peculiar to the islands, and there are almost no species in common with the rest of South America.

Gal'ate'a, in classic mythology, a nymph, the daughter of Nereus and Doris, who rejected the suit of the Cyclops Polyphemus and gave herself to the Sicilian shepherd Acis. The monster surprised them and crushed Acis beneath a rock. See PYGMALION.

Galatia, *ga la'she ah*, the ancient name of an extensive region in Asia Minor, so called from its Gallic inhabitants, who settled there in the third century B. C. These were compelled by Attalus, king of Pergamos, to settle within well-defined limits between Paphlagonia, Pontus, Cappadocia, Lycaonia, Phrygia and Bythinia. Galatia became a Roman province under Augustus and was divided into provinces by Theodosius. It was twice visited by the apostle Paul, who later addressed one of his famous letters to the people of Christian churches in the region. It forms the ninth book of the New Testament. See GALATIANS, THE EPISTLE TO THE.

Galatians, THE EPISTLE TO THE, a letter of the New Testament, written by Paul to the Galatian churches, to warn them against those who

were trying to influence them to adopt Jewish rites and to defend himself from the unjust criticisms being made. The letter is claimed by some to be earlier than those to the Thessalonians.

Galatz or **Galacz**, *gah'lahts*, a town and port of Rumania, in Moldavia, on the left bank of the Danube, between the mouths of the Sereth and Pruth. The new portion of the town is substantially built and is the seat of the European commission for the control of Danube navigation. The city is an important trading center and port, the chief exports being grain (principally maize), wine, planks and tallow. The imports are chiefly British manufactures, sugar, tin plates, iron and steel, coal, oil, fruits, tobacco, fish, glassware, leather and coarse cloth. Population in 1912, 71,719.

Gal'axy. See MILKY WAY.

Gal'ba, **SERVIUS SULPICIUS** (3 B. C.—69 A. D.), a Roman emperor. He served as general in Germany and as proconsul to Africa, his services there obtaining him the honors of a triumph. He then lived in retirement till the middle of Nero's reign, when the emperor appointed him governor in Spain. Nero soon afterward, however, ordered Galba to be secretly assassinated. Galba revolted, and on the death of Nero, he himself was chosen emperor by the praetorian cohorts in Rome. He went directly to Rome, but soon made himself unpopular by cruelty and avarice, and was slain in the Forum.

Galen, properly **Claudius Galenus**, (130–200 A. D.), a Greek physician. Among the many writings attributed to Galen are eighty-three treatises acknowledged to be genuine. The most valuable of his works were those dealing with anatomy and physiology, and he was the first to establish the consultation of the pulse in determining the nature of disease. Till the middle of the sixteenth century his authority in medicine was supreme.

Gale'na, **ILL.**, the county-seat of Jo Daviess co., 17 mi. s. e. of Dubuque, Ia., on the Galena River and on the Illinois Central, the Chicago & Northwestern and the Chicago, Burlington & Quincy railroads. General U. S. Grant lived here for a time before the opening of the Civil War, and the old homestead is still a feature of interest. The city contains a fine Federal building, a public library and Grant Park, with a statue of the general. There are lead and zinc mines in the vicinity, and the city contains smelting works and shoe and other factories. The town was settled in 1827 and was chartered as a city in 1839. Population in 1910, 4835.

Galena, **KAN.**, a city in Cherokee co., 7 mi. w. of Joplin, Mo., on the Saint Louis & San Francisco and the Missouri, Kansas & Texas railroads. It is in a mining region about four miles square, which produces large quantities of lead and zinc and contains about 200 concentrating mills. The city also has lead smelters, a large foundry and a planing mill. Galena was settled and incorporated in 1877. It grew very rapidly between 1890 and 1900, but later it began slowly to decline. Population in 1910, 6096.

Galena or **Lead Glance**, the sulphide of lead, found both in masses and crystallized in cubes. Its color is bluish-gray, like lead, but brighter. It has a metallic luster and foliated texture and is soft and brittle. For the most part it contains about eighty-seven parts lead to thirteen of sulphur, and generally it also has some silver, antimony, zinc, iron and bismuth. Where the proportion of silver is high it is known as *argentiferous galena*, and it is then worked with a view to the extraction of this metal. In the United States galena is abundant, occurring in large quantities near Galena, Ill., in Colorado, Idaho and Montana, and in smaller quantities in Iowa, Missouri and Wisconsin. See **LEAD**.

Galesburg, *gaylz'burg*, **ILL.**, the county-seat of Knox co., 43 mi. n. e. of Burlington, Iowa, on the Atchison, Topeka & Santa Fé, the Chicago, Burlington & Quincy and other railroads. The city has an attractive location and is the seat of Knox College and Lombard University. The industrial establishments include railroad shops, stockyards, iron foundries, brickyards and manufactures of engines, wagons and agricultural implements. The place was settled in 1837 by New Yorkers and was named in honor of Rev. George W. Gale, who planned the town as the site for a theological seminary and a rallying-ground for the "Free-Soilers" of the territory. Population in 1910, 22,089.

Galicia, *ga lish'e ah*, a province of Austria, bounded by Russia, Bukowina, Hungary and Silesia. It has an area of about 30,300 square miles, consisting mostly of hills and plateaus, and is separated from Russian Poland by the Carpathian Mountains. Several rivers of importance flow through the country, those in the west being tributaries of the Vistula, those in the east, of the Danube and Dniester. The climate is severe, particularly in the south, the summers being very warm, but comparatively short. The soil in general is fertile and yields abundant crops of cereals, hemp, flax, tobacco, hops and

beets. The domestic animals include great numbers of horned cattle and a fine, hardy breed of horses. Bears and wolves are still found in the forests, and all the lesser kinds of game are in abundance. The minerals include marble, alabaster, copper, calamine, coal, iron and rock salt. Only the last two are of much importance. The most important rock salt mines are at Wieliczka. Distilleries exist in every quarter. The chief educational establishments are the University of Leimberg and that of Cracow. These two places are also the principal cities, and the former is the capital. Galicia is now one of the Cis-Leithan provinces of Austria-Hungary. Polish is the language of official intercourse and of the higher educational institutions. Population in 1910, 8,025,675.

Gal'ilee, in the time of Jesus Christ the most northern province of Palestine. bounded on the e. by the river Jordan, on the s. by Samaria, on the w. by the Mediterranean Sea and Phoenicia and on the n. by Syria and the Mountains of Lebanon. It was in a sense the cradle of Christianity, Nazareth, Cana, Capernaum, Nain and other places being intimately associated with the life of Christ. The inhabitants of this country, mostly poor fishermen, on account of their ignorance and simplicity of manners were despised by the Jews, who, by way of contempt, called Christians, at first, *Galileans*. At present Galilee is included in the province of Syria. See PALESTINE.

Galilee, SEA OF. See GENNESARET, LAKE OF.

Galile'o (1564-1642), the common designation of Galileo Galilei, a most distinguished Italian philosopher and astronomer, born at Pisa and educated at the university there. When he was nineteen years of age, the swinging of a lamp in Pisa cathedral led him to investigate the laws of the oscillation of the pendulum, which he subsequently applied in the measurement of time, and in 1586 the works of Archimedes suggested his invention of the hydrostatic balance. He now devoted his attention exclusively to mathematics and natural science and was made professor of mathematics at the University of Pisa and later held the same position in Padua, where he continued eighteen years. His lectures there acquired European fame, and there also he made the important discovery of the law regulating the motion of falling bodies. If he did not invent, he improved, the thermometer and made some interesting observations on the magnet. His most remarkable discovery was

that of Jupiter's satellites, and he observed, though imperfectly, the rings of Saturn. He also detected the sun's spots and inferred, from their regular advance from east to west, the rotation of the sun and the inclination of its axis to the plane of the ecliptic. In 1610 Cosmo II, grand duke of Tuscany, appointed him grand-ducal mathematician and philosopher, and he lived



GALILEO

sometimes in Florence and sometimes at the country seat of his friend Salviata, where he discovered the varying phases of Mercury, Venus and Mars. In the next year he visited Rome for the first time and was treated with great distinction. Four years later he again visited Rome, but this time was not so warmly received, as in the meantime he had published his work on the solar spots, in which he had advocated the Copernican system, in spite of the hostility of the churchmen. He was, in consequence, denounced as a propounder of heretical views. Some time afterward he wrote his most famous work and received papal permission to publish it, but hardly had it been issued, when Pope Urban VIII, having been led to believe that Galileo had satirized him in this work, allowed him to be summoned to Rome in 1623 to be tried by the Holy Office. Several writers asserted that Galileo was imprisoned for heresy; but

most modern authors agree that although a sentence of imprisonment was pronounced upon him it was never enforced. His remains were buried within the Cathedral of Santa Croce, in Florence.

Gal'ion, OHIO, a city in Crawford co., 80 mi. s. w. of Cleveland, on the Erie and the Cleveland, Cincinnati, Chicago & Saint Louis railroads. Its industries include railroad shops, brick and tile works, wagon factories, iron foundries and lumber mills. The place was laid out in 1831 and became a city in 1878. Population in 1910, 7214.

Gall, *gahl*, FRANZ JOSEPH (1758-1828), the founder of phrenology, born in Tiefenbrunn, Baden. He studied medicine and practiced at Vienna as a physician where he made himself known to advantage. After a series of comparisons of the skulls of both men and animals, he was able to assign the particular location of twenty organs. He accompanied Dr. Spurzheim, in 1807, to Paris, where he published with Spurzheim, in 1810 and 1812, several books on the nervous system. See PHRENOLOGY.

Gallait, *ga lay'* LOUIS (1810-1887), a Belgian historical painter. His best known works are *Montaigne Visiting Tasso in Prison*, *Abdication of Charles V*, *The Dead Bodies of Counts Egmont and Horn*, *The Last Moments of Count Egmont*, *Alva Signing Death Warrants* and *The Plague at Tournai*. This last was purchased for the Brussels Museum at the price of \$24,000.

Gallas, *gahl'las*, a numerous and powerful race, chiefly inhabiting a territory in East Africa, lying to the south of Abyssinia. Their color varies from a deep black to a brownish yellow. In stature they are tall, with spare, wiry and muscular bodies. Their noses are often straight, or even arched; their lips are moderate, and they often wear their hair hanging over their necks in long, twisted plaits. They are brave, but ferocious and cruel, cunning and faithless. Their language is spoken throughout a great part of Africa.

Gal'latin, ALBERT (1761-1849), an American statesman and financier, born in Geneva, Switzerland. He received a thorough education in his native land and then emigrated to the United States, arriving in 1780. He entered business, but without success, was instructor in Harvard College for a time and then removed to Fayette County, Pa. Here he became prominent as an earnest opponent of the Federal Constitution and served as an Anti-Federalist in the state legislature in 1793. He was elected to the

United States Senate, but was forced to withdraw because he had not lived the requisite time in the United States. He was an opponent of the excise law, but labored earnestly to suppress the Whisky Insurrection. In 1795 Gallatin entered Congress, becoming a leader of the Republican party, and displaying preëminent ability as a judge of financial measures. Jefferson therefore made him secretary of the treasury in 1801. During his term he carried out Hamilton's wise policy, but instituted original reforms which decreased the national debt and placed the finances of the nation in a condition where a successful war with England could be carried on without serious embarrassment. He strongly opposed the War of 1812, labored earnestly to bring about peace and was a leading negotiator in the Treaty of Ghent. He refused to resume the secretaryship of the treasury in 1816, but accepted the office of minister to France, which he filled until 1823. Three years later President Adams appointed him as minister to England, but after two years he withdrew to private life.

Gall, *gawl*, **Blad'der**, **THE**, a pear-shaped sac, attached to the under side of the liver, the small end contracting into the cystic duct. The walls of the gall-cyst are composed of an outer, or serous, coat, continuous with the peritoneum, a middle, or muscular, coat, and an inner, or mucous, coat. This bladder acts as a storehouse for bile. During the interval between meals, the bile, which is continually being secreted by the liver, passes into the common bile duct. to find the opening into the duodenum closed by its sphincter muscle; it is therefore forced up through the cystic duct, which has an opening into the common duct, into the gall bladder, where it remains till food enters the small intestine. By some reflex movement the bile is then discharged with force enough to open the sphincter. See BILE; DIGESTION.

Gal'ley, a low, flat-built vessel, with one deck, once commonly used in the Mediterranean. It was navigated with sails and oars. The common galleys varied from 100 to 200 feet in length, those of smaller sizes being known respectively as half-galleys and quarter-galleys. The larger ones carried as many as twenty oars on each side, each oar worked by one or more men, and they had commonly two masts with lateen sails. Raised structures in the sterns, and even in the prow, were not uncommon. These, however, were more fully developed in the kind of galley known as the *galleass*, which

carried three masts, from 200 to 300 rowers and sometimes twenty guns. France formerly had a number of galleys for service in the Mediterranean, in which convicts were forced to labor. The term galley is also applied to the ships of the ancient Greeks and Romans, especially to their war ships, which were propelled chiefly by oars.

Gal'linule, a name for certain water birds belonging to the rail family. Though not web-footed, they are good swimmers, for their toes are furnished with a narrow membrane. The only American species is the purple gallinule, found mainly in the Southern states, but occasionally in the Middle and Northern states.

Gallip'oli, a town in European Turkey, on a peninsula of the same name at the n. e. end of the Dardanelles, 128 mi. w. s. w. of Constantinople. It was once fortified, but is now in a generally dilapidated condition, with no edifice of note except the bazaars. It has manufactures of cotton, silk and morocco leather, and it also has two harbors, one used as a station for the Turkish fleet and the other for trade, chiefly in corn, wine and oil. It was the gate by which the Turks entered Europe (1357), and in the Crimean War the allied forces landed here (1854). Population, about 25,000.

Gal'lipolis', OHIO, the county-seat of Gallia co., 56 mi. s. e. of Chillicothe, on the Ohio River and on the Toledo & Ohio Central and other railroads. The city is in the neighborhood of coal fields and has iron and wood-working establishments and manufactures of furniture, stoves, woollens and other articles. It has a public library and Gallia Academy. The place was settled in 1790 by a party of Frenchmen under the Scioto Company. Population in 1910, 5560.

Gal'lium, a rare malleable metal, discovered by spectrum analysis in 1875 by De Boisbaudran in zinc blende of Pierrefitte in the Pyrenees. It is of a grayish-white color, has a brilliant luster and is fused by the mere warmth of the hand. In its properties it is related to aluminum.

Gal'lon, a unit of capacity in the English system of weights and measures, used chiefly for measuring liquids. It contains 231 cubic inches, being equal to a cylinder 7 inches in diameter and 6 inches high. It is equivalent to 3.7853 liters. In England an *imperial gallon* is also used, containing 277.274 cubic inches. A gallon is divided into 4 quarts, each quart into 2 pints and each pint into 4 gills.

Galls, *gawls*, unnatural growths in plants,

produced by the deposit of the egg of an insect, especially the gallfly, in the bark or leaves. The galls of commerce are produced in the tender shoots of a species of oak, abundant in Asia Minor, Syria and Persia. They are spherical and vary in magnitude from the size of a pea to that of a hazel-nut. White, green and blue varieties are recognized, the last kind being the best. The peculiar properties of the galls rest in gallic acid, a white substance which is obtained from them. Galls are extensively used in dyeing and in the manufacture of ink, and they are also frequently used in medicine. They are chiefly imported from Aleppo, Tripoli and Smyrna.

Galsworthy, JOHN (1867—), an English author whose dramas and novels have attracted wide attention. Almost all his works deal with present-day social questions, and as he is distinctly a realist his method is to state problems rather than to solve them. He possesses an attractive literary style and the ability to present characters clearly and sympathetically. His novels include *Villa Rubein*, *The Man of Property*, *The Country House*, *Fraternity*, *A Motley* and *The Patrician*; and noteworthy among his plays are *Strife*, *Justice* and *The Pigeon*.

Galton, *gawltun*, FRANCIS (1822–1911), an English scientist, the cousin of Charles Darwin. He was born at Duddleston, Warwickshire, and educated at King's College, London and Trinity College, Cambridge. His extensive travels in Africa led to works on the topography of southwest Africa, and he published also *Meteorographica*, studies in meteorology which introduced the system of charting the weather which remains in use today. Most important of Galton's contributions to science, however, were his studies in heredity. He sought for the principles governing the inheritance of physical and mental traits, and founded the science which deals with the possibility of improving the hereditary qualities of the human race. To this new science he gave the name of *eugenics*, which means "well born." His works treating of this subject include *Hereditary Genius* and *Natural Inheritance*. See EUGENICS.

Galvani, *gal vah'ne*, LUIGI (1737–1798), an Italian physician and physiologist, born at Bologna. He practiced medicine in Bologna and was in 1762 appointed professor of anatomy at the university. He gained reputation as a comparative anatomist; but his fame rests on his theory of animal electricity, enunciated in a treatise published in 1791. Twenty years before

the publication of this treatise, he had been making experiments on the relations of animal functions to electricity. In 1797 he was deprived of the chair of anatomy for refusing to take the oath of allegiance to the Cisalpine Republic, but he was restored to it in less than a year. See ELECTRIC BATTERY.

Galvanic Battery. See ELECTRIC BATTERY.

Galvanism, the production of electricity by chemical action. The name is derived from Galvani, professor of anatomy at Bologna, who observed that the limbs of a dead frog could be caused to move by the contact of metals. His experiments attracted the attention of Volta, professor of natural philosophy at Pavia, who shortly afterward invented the galvanic, or voltaic, battery. See ELECTRIC BATTERY.

Galvanized Iron, a name loosely given to sheets of iron coated with zinc. The iron is first cleansed by friction and the action of dilute sulphuric acid, and is then plunged into a bath, composed of melted zinc and sal-ammoniac. As the zinc cools, it forms in crystals on the surface, and this gives to galvanized iron its mottled appearance. So long as the coating is entire, and is not exposed to corrosive substances, galvanized iron is very durable. It is used for making cornices, jackets for furnaces and vessels for holding water. Drinking water should not be kept in galvanized iron vessels, because the zinc dissolves and poisons the water.

Galvanometer, an instrument for measuring the strength of a delicate electric current. While there are numerous patterns of galvanometer, all are constructed on the principle that an electric current will change the direction of a magnetic needle. The galvanometer consists of a magnetic needle delicately balanced over an electro-magnet. When a current is sent through the coils of the magnet, the needle is turned to the right or left, according to the direction of the current. The strength of the current is estimated by the number of degrees over which the needle moves.

Galveston, TEX., the county-seat of Galveston co., on an island of the same name at the mouth of Galveston Bay, and connected with the Southern Pacific, the Gulf, Colorado & Santa Fé, the Missouri, Kansas & Texas and other railroads; and there are also regular steamship lines to American coast cities and to all important foreign countries, and an electric road to Houston. The city is the seat of the state medical university, Saint Mary's University, the Ball

High School and various other educational and charitable institutions. Prominent among these is the Rosenberg Library, which cost \$150,000 and has an endowment of \$400,000. Other important structures are the Sealy Hospital, the courthouse, the custom house and postoffice, the railroad station, the Y. M. C. A. building and several fine business houses.

Among the industrial establishments are ice-plants, iron works, cottonseed oil mills, rice and flour mills and manufactories of cement, pipe, clothing, flour and various foods. The channel between the island and the mainland has been so improved by the Federal government that it now affords an entrance of 28 feet of water into an excellent harbor, with a wharf frontage of over six miles. During the year 1905-1906 the city advanced to the second place among the exporting ports of the United States, and it has long occupied first place in exporting cotton. Other foreign exports are cottonseed oil, wheat, copper, iron ores, cattle and provisions.

The first permanent settlement was made here in 1837 and incorporation followed two years later. The city suffered from a big fire in 1885. In 1900 it was the scene of a terrible disaster from a hurricane, originating in the West Indies. About \$18,000,000 worth of property was destroyed and about 6000 lives were lost in the city and adjacent country. The city is now protected by a sea wall, completed in 1904, which forms the greatest structure of the kind in the world. It is 17,593 feet long, 16 feet wide at the base and 5 feet at the top, and stands 17 feet above mean low tide. Just after the great storm of 1900, this city originated and adopted the Commission Form of City Government. Population in 1910, 36,981.

Galveston Bay, an inlet of the Gulf of Mexico, separated from the main gulf by Galveston Island. Its area is about 450 square miles and its length from the city of Galveston northward, about 35 miles.

Galway, a seaport of western Ireland, capital of the County of Galway, at the mouth of the Corrib, in Galway Bay, 117 mi. w. of Dublin. The chief exports are agricultural produce and marble. There are mills for sawing and polishing marble, a brewery, a distillery, foundries and flour and other mills. The town has a good harbor and good fisheries. The chief buildings are the Church of Saint Nicholas, Saint Augustine's Catholic church, Queen's College and several monasteries and nunneries. Population in 1911, about 14,500.

Galway Bay, a large bay on the west coast of Ireland, between County Galway on the north and County Clare on the south, about 30 miles in length and from 7 to 20 miles in breadth. Across its entrance lie the Arran Islands, and there are numerous small islands in the bay.

Gama, *gah'ma*, VASCO DA (1469-1524), the first navigator who made the voyage to the East Indies by the Cape of Good Hope. He was born in Portugal, of a noble family. He sailed from Lisbon on July 8, 1497, and, doubling the Cape, to Calicut, returning to Lisbon in 1499. For sailed this exploit he was named admiral of the Indies, with an annual pension and extensive privileges in Indian commerce. In 1524 he was appointed viceroy of India by King John III, but he died in the same year.

Gama Grass or **Sesame Grass**, an American grass, of which but two or three species are known. Because of its ability to endure a long drought, it is a valuable fodder grass in dry regions and is cultivated especially in the southwestern United States, Mexico, parts of Europe and Australia.

Gambet'ta, LEON (1838-1882), a French statesman. In 1869, having been elected by both



LEON GAMBETTA

Paris and Marseilles, he chose to represent the southern city in the Chamber of Deputies and showed himself an irreconcilable opponent of the Empire and its measures, especially of the policy which led to the war with Prussia. When the

Germans encircled Paris, he left that city in a balloon and set up his headquarters at Tours, from which, with all the powers of a dictator, he directed for a short time a fierce but vain resistance against the invaders. After the close of the war he held office in several short-lived ministries, and in November, 1881, he became premier.

Gam'bia, a British colony and protectorate in West Africa, at the mouth of the river Gambia. The area of the colony is 4 square miles; of the protectorate 4,500 square miles. The climate is very unhealthy in the rainy season, and there is little fertile land in the colony, but a considerable trade is carried on in groundnuts, hides, beeswax, rice, cotton, maize, ivory, ginger, gum arabic and palm oil. Population of the colony in 1911, 7700; of the protectorate, 138,000.

Gambia, a river of West Africa, rising in a mountainous district in Futa Jallon and flowing northwest and west to the Atlantic. Its length is over 700 miles. It is navigable for 600 miles during seven months of the year, but from June to November the river becomes a torrent, rising from 20 to 50-feet and leaving a rich alluvial deposit on its shores.

Gam'bir, a puckery, earthy-looking substance, chiefly employed in tanning and dyeing, and obtained from East Indian trees. It is mainly imported from Singapore.

Gambling or **Gaming**, in general usage, the playing of a game of hazard for the purpose of pecuniary gain. Gambling is now discountenanced by all civilized communities, and contracts made in gambling are not recognized as binding in law. Almost all countries now have laws forbidding or greatly restricting the practice. In the United States and England any one who keeps a gambling house may be punished for maintaining a nuisance, and any one who cheats at games can be indicted for obtaining money under false pretenses. There is a tendency to make the laws against gambling more strict and to bring within the application of the law a greater number of practices. It has been held that contests of skill in which there is a prize are not gambling unless the element of chance predominates. Thus, contestants in a foot race for a prize would not be gamblers, but bettors upon the result of the contest would be gamblers. See WAGER.

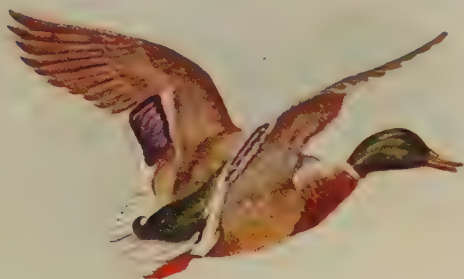
Game, in its original and widest sense a word which means any sport or amusement. It has two important derived meanings: first, a sport played according to fixed rules; second, those animals which are the objects of the chase and



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GAME ANIMALS OF NORTH AMERICA

1—Caribou. 2—Moose. 3—Wapiti. 4—Pronghorn. 5—Bighorn Sheep. 6—Bison (no longer at large).



1



2



3



4



5



6



7

KATE ABELMANN

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GAME BIRDS OF NORTH AMERICA

1—Mallard Duck. 2—Prairie Hen. 3—Canvasback Duck. 4—Wild Turkey. 5—Snipe. 6—Partridge.
7—Canada Goose.

are hunted for their flesh, as distinguished from meat, fish and poultry. The game animals of the world are the wild animals. In Africa and some other parts of the world, lions, tigers, panthers, leopards, foxes, alligators and many other large animals are regarded as *big game*, though their flesh is almost never eaten. In the United States and Canada the only important big game animals are bears, moose, deer, antelopes, mountain sheep and goats. The buffalo was formerly one of the game animals, but is now almost extinct. Of the smaller animals, foxes, rabbits and hares are most common.

The game birds are more plentiful than the quadrupeds. An extensive list is not possible here; only the most important are given: partridge, grouse, plover, quail, snipe, curlew, woodcock, rail, ducks, swans and geese. The term wild fowl is usually applied only to the last three. Among the common varieties of ducks are the mallard, redhead, canvasback, teal, pintail and wood duck. See color-plates, GAME ANIMALS, GAME BIRDS.

GAME LAWS. In modern times the growth of population and the threatened extinction of all wild game has led to the passage of laws for the regulation of hunting, both to protect game from destruction and to protect persons in the legitimate enjoyment of such sport. Such laws have been passed from time to time in America ever since the landing of the Pilgrims, in almost every case for the purpose of protecting the game. Hunting and fishing are regulated chiefly by compelling the taking out of licenses, by limiting the number which each hunter may kill or may ship, by making more stringent the laws of trespassing and by forbidding the killing during the mating season and period of reproduction. The chief subjects of such laws have been the deer, quail, grouse, prairie chicken, ducks and especially valuable or rare fish, such as trout and muskellunge. In almost every state of the United States and in every province of Canada, the killing of quail, grouse, prairie chickens, ducks, moose and deer is prohibited during certain seasons varying according to the habits of the species of the several localities. By an act of Congress, approved March 4, 1913, all birds which do not remain within the borders of a single state are placed under the protection of the United States department of agriculture. The regulations permitted by the law were proclaimed by the president on October 1, 1913; they established a breeding zone and a wintering zone, with separate closed seasons for each.

GAME PRESERVES AND RESERVATIONS. In medieval Europe it was the rule for princes to maintain private breeding and hunting grounds. This custom was adopted by the nobles and is still in force in Austria-Hungary, Germany, England and Scotland, where immense properties known as hunting estates are maintained by private land owners for the preservation of game.

In the United States the preservation of game has been assumed as a function of the national, state and local governments, and the greatest efforts are being made to prevent the extinction of peculiar species, such as the bison, the caribou, the eagle and other interesting birds and beasts. To further this end, tracts of land have been set aside where such animals can live the life their instincts demand, free from the depredations of hunters or the annoying presence of settlers. The first and largest of such reservations in the United States is the Yellowstone National Park, having an area of over three thousand square miles. At the present time there are many such sequestered tracts, situated in states and territories west of the Mississippi River, embracing a total area of more than ten thousand square miles. Canada has also made generous provisions for the same purpose, the largest of all such reserves being the Rocky Mountain Park, Alberta, with an area of 4500 square miles.

Beside these government reservations, there are large private parks ranging from 10,000 to 80,000 acres, each. Probably the finest game preserve in America is that of the late George W. Vanderbilt at Biltmore, North Carolina. The game preserves in Canada are of enormous extent, though comparatively few in number. That of the Roberval Club, in the Laurentian Mountains, contains over 500 square miles.

Ganges, gan'jeez, a river of Hindustan, one of the greatest rivers of Asia, rising in the Himalaya Mountains, in Garhwal, and formed by the junction of two head streams, the Bhagirathi, which emerges from a glacial cavern, 13,800 feet above sea level, and the Alaknanda. These unite at Deoprag, 133 miles from the source of the Bhagirathi. At Hardwar, about 30 miles below Deoprag, the river enters the great valley of Hindustan and flows in a southeast direction till it discharges itself by numerous mouths into the Bay of Bengal, after a course of about 1500 miles. In its course it receives the Jumna, Ramgunga, Gumti, Gogra, Son and Kusi rivers. In the rainy season the flat country of Bengal is overflowed to the extent of 100 miles in breadth,

the water beginning to recede after the middle of August. The Ganges delta, which is seemingly the largest delta in the world, has the Hugli on the west and the Meghna on the east and commences about 200 miles from the sea. The valley is one of the most fertile in the world and grows almost all kinds of Indian vegetation, including rice, fruit, cotton, indigo, opium, sugar and grains. The value of the Ganges as a highway for commerce is very great. Some of the principal cities on it and its branches, ascending the stream, are Calcutta, Murshedabad, Bahar, Patna, Benares, Allahabad, Cawnpore and Faruckabad. It is an imperative duty of the Hindus to bathe in the Ganges, or at least to wash themselves with its waters and to distribute alms, on certain days. The Hindus believe that whoever dies on its banks and drinks of its waters before death is exempted from the necessity of returning into this world and commencing a new life.

Ganges Canal, a canal extending along the Ganges River from Hirdwoc to a point on the Jumna, a little above its junction with the Betwa. Its total length exceeds one thousand miles, for four hundred of which it is navigable.

Gan'gion, the enlargement of a nerve, containing cells and fluids and acting as a center for communication with other sets of nerves or for strengthening nervous impulse. See NERVOUS SYSTEM.

Gan'grene, the death of some part of a living body, wherein the tissues are in a state of mortification. If a vital part is so affected, death will ensue, but a local affection may be stopped by amputation or, in milder cases, by natural causes. Formerly, gangrene was a common accompaniment of wounds, especially in times of war, but modern aseptic methods prevent gangrene in nearly every wound that is promptly treated.

Gan'net, a large sea bird, about three feet in length, with a wing expansion of six feet. It has a dirty white plumage and pale yellow eyes, surrounded by a naked blue skin. Its straight bill is about six inches long and is furnished, underneath, with a kind of pouch. The gannet is found from the Arctic Sea to the Gulf of Mexico and breeds in great numbers near the coast of Labrador. The birds hunt from high in the air, and when they see a fish they drop straight upon it with wonderful accuracy. When on land the bird is absurdly fearless, and the mother will remain on her nest, merely pecking at the hand that is put out toward her.

Gansevoort, *gans'voort*, PETER (1749-1812), an American soldier, born in Albany, N. Y. In the Revolutionary War he was appointed major of a New York regiment of patriot volunteers, was with the Montgomery expedition to Canada, and in August, 1777, defended Fort Schuylcr against the attack of Saint Leger with a force of British regulars, Tories and indians. At the close of the war he was made brigadier general of New York state militia and later was given the same rank in the regular army.

Gan'ymede, in Grecian mythology, a Trojan youth of such great beauty that even the gods wondered at him. Jupiter sent his eagle to steal the boy from Mount Ida and carry him to Olympus, where he succeeded Hebe as cup-bearer to the gods.

Gapes, a disease of fowls, arising from the presence in the windpipe of small, parasitic worms, which cause the bird continually to open its beak and to cough. The parasites may be dislodged with a feather dipped in turpentine or by mixing a little epsom salts with the food.

Gar, the name of two different fishes, which are similar in structure and appearance. The marine garfish is round and slender, is from 3 to 5 feet long and has a stout bill, formed by a prolongation of the jaws. They are widely distributed in the warm oceans and live upon smaller fish. The fresh-water garfish has a long, nearly cylindrical body, covered with bony scales; the head has a long bill with a series of sharp teeth. This fish is common in lakes and rivers in the eastern part of the United States.

Garage, *gar-azh'*, an establishment where automobiles are stored and cared for. A public garage is sometimes called an automobile livery.

Garbage, *gahr'bij*, the waste matter, mostly of animal or vegetable origin, that comes principally from kitchens. This waste quickly decays if exposed to the air and becomes a source of disease. If it is thrown upon the ground, the water supply and the air in that vicinity are contaminated. In the country and in small towns a great deal of garbage is consumed by domestic animals and so rendered harmless, though if the troughs in which it is held are not frequently cleaned, the animals themselves may suffer. In large cities it becomes necessary to dispose of the garbage very quickly, and the difficulty of doing so has often resulted in neglect, and this has caused serious epidemics of disease. In large cities garbage cans are placed in the alleys, and into these the refuse from the houses is thrown. Every day this is

collected and hauled to its destination, the combustible parts are burned and the others are destroyed or disinfected. The removal of this garbage is so heavy an expense that many plans have been advocated for recovering some of the money by using the refuse to advantage. Several successful plans are in operation.

Garcia, *gahr the'ah*, MANUEL DEL POPOLO VICENTE (1775-1832), a celebrated Spanish vocalist and music teacher, born at Seville. He went to Paris in 1808 and sang Italian opera, meeting with the greatest success. His triumph was repeated in Italy some years later, and in 1817 he went to London, where he was accorded the highest honors. Later Garcia toured America, where he was warmly received. His fame rests principally, however, upon his principles of teaching, which are now acknowledged to be essential to the best musical instruction. He was the father of Maria Felicita Malibran and was the teacher of many famous operatic singers.

Garcia Y Iniguez, *gahr se' a e e ne' ges*, CALIXTO (1836-1898), a Cuban patriot and soldier, born at Holguin, Santiago Province. He began the practice of law, but in 1868 he became a leader in the Cuban insurrection and later succeeded Maximo Gomez as commander in chief of the Cuban forces. At one time, being surrounded by a greatly superior force, he attempted to commit suicide rather than be captured, but was taken to Spain and imprisoned. Afterward he joined in another Cuban rebellion, was again captured and was taken to Spain, where he was held for fifteen years. He escaped in 1895 and came to the United States, where he engaged in filibustering. He succeeded in reaching Cuba and won important victories as one of the chiefs of the Cuban forces. After the occupation of Cuba by the Americans, he was appointed one of the commissioners to discuss Cuban affairs with the United States government at Washington and died during that conference.

Garcilazo de la Vega, *gahr'the lah'so da lah va' gah* (about 1540-1616), an historian of Peru, surnamed the Inca, son of one of the conquerors of Peru and a princess of the race of the Incas. His great work is the *Royal Commentaries of Peru*, valuable as almost the only account of ancient Peru. He wrote also a *History of Florida*.

Garda, *gahr'dah*, the largest lake in Italy, belonging to the Alpine region, 33 miles long and 3 to 11 miles broad. Its greatest depth is 1135 feet and it is 213 feet above sea level.

Steamboats ply on it, and its shores are covered with villas.

Garden City, a popular name for Chicago.

Gardening, the art of growing vegetables, fruits and flowers (See HORTICULTURE). Gardens have been known since the earliest days of civilization, and from that time to the present gardening has been common among all civilized people. The most recent developments in gardening in the United States consist in the introduction of gardens into school grounds, and the extending of gardening to many homes and vacant lots in large cities through the agency of the schools and by garden associations coöperating with them.

SCHOOL GARDENS. While the school garden in the United States is of comparatively recent date, it has been in existence in Europe for a long time, and European countries now have over one hundred thousand school gardens. In Russia and several other countries, no school can receive aid from state funds unless it has a garden. A school garden is valuable for the following reasons: (1) It enables the pupils to gain a practical knowledge of farm crops; (2) it assists in giving the pupils practical training; (3) it affords the best opportunity for nature study; (4) it affords opportunity to train pupils to habits of industry and to develop the feeling of ownership and responsibility; (5) it affords one of the best means of assisting pupils to gain an all-around development; (6) it helps to keep the boys and girls on the farm.

In making a school garden the following suggestions will be found helpful: (1) Secure the consent and coöperation of the school directors; (2) have your plans well matured before beginning work on the ground; (3) so plan the work that it will be done out of school hours; (4) study and work with enthusiasm, make the garden succeed and it will be popular.

Garden of Europe, a name given to Italy.

Garden of the Gods, a beautiful region about five miles northwest of Colorado Springs, noted for the curious and grotesque shapes into which the colored sandstone has been worn. The garden has an area of 500 acres. Two huge masses of bright red sandstone, 330 feet high and separated just enough to allow a roadway between them, form the Gateway of the Garden of the Gods. Other famous rocks, whose names indicate their shape, are the Cathedral Spires, the Balanced Rock, the Seal and the Bear.

Gar'diner, MAINE, a city in Kennebec co., 6 mi. s. of Augusta, on the Kennebec River and

Gardiner

on the Maine Central railroad. It has good water power and extensive lumber, paper and pulp mills, machine shops, foundries and various wood-working establishments. Ice is one of the most important exports. The place was settled in 1760, but remained a part of Pittston until 1803; it was chartered as a city in 1849. Population in 1910, 5311.

Gardiner, SAMUEL RAWSON (1829-1902), an English historian, born at Ropley, Hants, England, March 4, 1829, and educated at Winchester and Christ Church, Oxford. He also studied at Edinburgh and Göttingen and was for many years professor of modern history at King's College, London, and later at Oxford. He was appointed to succeed Froude as regius professor of modern history at Oxford, but declined. Gardiner was the author of numerous historical works of the highest value, of which the most important are *The History of England from the Accession of James I to the Outbreak of the Great Civil War*, *The History of the Great Civil War*, and *The History of the Commonwealth and Protectorate*. The last was not quite completed at his death. In these works he gave the most exhaustive and impartial discussion of the period that has yet been written. Another important work was *The First Two Stuarts and the Puritan Revolution*, which was a condensed but exceedingly valuable story of the same period. He also wrote a *Students' History of England* and *An Introduction to the Study of English History*, both of which are commonly used in England and America as text-books.

Gardiner, STEPHEN (1483-1555), an English prelate. Having become secretary to Wolsey and being a favorite with the king, he was dispatched to Rome in 1528 to forward Henry VIII's divorce and on his return was appointed successively secretary of state, archdeacon of Norwich and Leicester and bishop of Winchester. He also went on various embassies to France and Germany. He was imprisoned during the reign of Edward VI because of his opposition to the Reformation, but Mary made him lord chancellor and prime minister. He assisted at her coronation and at her marriage with Philip of Spain.

Gard'ner, MASS., a town in Worcester co., 25 mi. n. of Worcester, on two lines of the Boston & Maine railroad. It has a large chair manufacturing industry. The town contains the Heywood library, an almshouse, a home for the aged, and Dunn and Crystal Lake parks.

Garfield

It was incorporated in 1785. Population in 1910, 14,699.

Gar'field, N. J., a borough of Bergen co., on the Passaic River, opposite Passaic, and on the Erie railroad. Chemicals, woolen goods, clothing and paper are the most important manufactures of the town. Population in 1910, 10,213.

Garfield, JAMES ABRAM (1831-1881), an American soldier and statesman, twentieth president of the United States, born in Orange, Ohio. His father died soon after the boy's



JAMES A. GARFIELD

birth, leaving his wife, unaided, to bring up her four small children. At the age of ten, young Garfield already added to his mother's income by work on neighboring farms and by driving horses on the Ohio Canal. In winter he made steady progress in the district school, and in 1849 he entered Geauga Seminary, at Chester, Ohio. He next went to the college at Hiram, Ohio, supporting himself meanwhile by tuition, and finally graduated at Williams College, Mass., in 1856. Returning to the college at Hiram, he became its president in 1857, at the same time preaching and studying law.

He was elected to the state senate in 1859, and on the outbreak of the Civil War he received the command of a regiment of Ohio volunteers. In December, 1861, he was given a brigade.

with orders to drive the Confederates out of eastern Kentucky, and he won the battle of Middle Creek, Jan. 10, 1862, from which his commission as brigadier general was dated. He was promoted to be major general for gallantry at Chickamauga, Sept. 19, 1863, but resigned his command to enter Congress, at the age of thirty-two. He sat in Congress, rendering valuable assistance in military and financial questions, until 1880, and he was a leader of the Republican party in the House.

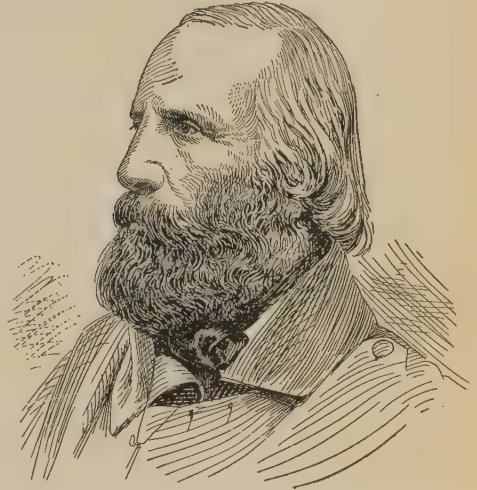
In January, 1880, he was elected United States senator, and in June of the same year he was named presidential candidate by the Republican convention at Chicago. Garfield's nomination came as a surprise to his party and was simply the result of a compromise between the supporters of Grant and Blaine. He proved, nevertheless, a strong candidate, regardless of precedent delivered speeches in his own behalf and finally defeated General Hancock by a narrow majority of the popular vote, but by 215 to 155 electoral votes. He identified himself with the cause of civil-service reform and thus increased the antagonism of the Conkling-Grant faction and caused the resignation of Conkling and Platt of New York from the Senate. On the morning of July 2, 1881, as he was setting off to witness the closing exercises of his old college, he was shot down by a disappointed office-seeker, Charles Guiteau. For weeks he lingered between life and death, but in September he died near Long Branch, N. J. where he had been taken in the belief that the change of air might do him good. He was buried in Cleveland, Ohio, where a beautiful mausoleum has been erected. A subscription was immediately started for the family, and in a short time over \$350,000 had been subscribed. When Guiteau was brought to trial his advocates attempted to show that he was insane, but convincing proof was lacking, and he was hanged in June, 1882. Consult Coffin's *Life of Garfield*.

Gargle, *gahr'g'l*, a wash for the throat. In using a gargle the head should be thrown well back, so as to keep the liquid in contact with the throat; then by expelling the air from the lungs through the liquid it is churned about and the throat is thoroughly washed. Care should be taken not to swallow the gargle, which usually contains drugs too powerful for the stomach.

Gar'goyle, in architecture, a spout jutting out from the roof gutter of a building to discharge water. Gargoyles were in use in ancient

Egypt and in classic architecture, where they were often made of marble, imitating in form a lion's or a boar's head. In medieval times, especially in Gothic architecture, they were used in all conceivable forms and sizes.

Garibaldi, *gah're bahl'de*, GIUSEPPE (1807-1882), an Italian patriot and hero. He received little education and for a number of years was a sailor on various trading vessels. In 1834 he became a member of the Young Italy party, was condemned to death for his share in the



GIUSEPPE GARIBALDI

schemes of Mazzini, escaped to Marseilles, took service in the fleet of the bey of Tunis and finally went to South America. In the service of the Republic of Rio Grande against the Brazilians he became known as a brilliant leader, and with his famous Italian legion he subsequently gave the Montevideans effective aid against Buenos Ayres.

In 1848 he returned to Italy, raised a band of volunteers and harassed the Austrians until the cessation of hostilities and the reestablishment of Austrian supremacy in Lombardy. He came to the United States and was for some years in command of a merchant vessel. He then purchased a part of the small island of Caprera, off the north coast of Sardinia, and made this his home for the rest of his life. Latterly the subscriptions of his admirers enabled him to become owner of the whole island. In the war of 1859, in which Sardinia recovered Lombardy, Garibaldi and his Chasseurs of the Alps did splendid service; and on the revolt of the Sicilians in 1860 he crossed to the island and

wrested it from the king of Naples, after a fierce struggle. He then recrossed to the mainland and occupied Naples, where he was proclaimed dictator of the Two Sicilies. It was now feared that Garibaldi might prove untrue to his motto, "Italy and Victor Emmanuel"; but he readily acquiesced in the annexation of the Two Sicilies to Italy and, declining all honors, retired to his island farm. In 1870 he gave his services to the French republican government against the Germans and rendered valuable assistance in the southeast. At the end of the war he was elected a member of the French assembly, but speedily resigned his seat and returned to Caprera. In January, 1875, Garibaldi took his seat in the Italian parliament, but he did not distinguish himself politically.

Garland, HAMLIN (1860-), an American novelist and poet. Among his novels, with their realistic pictures of western life, are *The Rose of Dutcher's Coolly*, *The Eagle's Heart* and *Captain of the Gray Horse Troop*, while of his other works may be mentioned his sympathetic biography of Ulysses Grant; his volume of criticism called *Crumbling Idols*, and his *Prairie Songs*, a volume of verse. As a short story writer Garland's rank is among the best, and *Main Traveled Roads* is a volume in his happiest style.

Gar'lic, a hardy perennial, allied to the onion, indigenous to the south of Europe and forming a favorite condiment among several nations. The leaves are grass-like and hollow, like those of the common onion. The stem is about two feet high; the flowers are white, and the root is a compound bulb, consisting of several smaller bulbs, commonly denominated *cloves*, enveloped by a common membrane. Garlic has a strong, penetrating odor and a pungent, acrid taste.

Gar'net, a mineral, occurring in twelve-sided crystals, usually of a dark red or cinnamon color, but sometimes white, green, brown or black. Because of their composition, garnets are classified into three groups: Those containing iron are known as *iron garnets*; those containing aluminum are known as *aluminum garnets*, and those containing calcium are known as *calcium*, or *chromium*, garnets. The aluminum garnets are usually the best; and the best of these are classified among the precious stones and when polished form beautiful gems. Jewelers, however, classify garnets as Syrian, Bohemian or Cinghalese, not necessarily because they came from these localities, but because of their rela-

tive value and fineness, those of the first quality being named Syrian and the second Bohemian. The Bohemian garnet is usually of a dark red and is the one most frequently seen as a gem in the United States. Garnets of the gem variety have been made artificially in Paris.

Gar'nishment, the process by which the claims or assets of a defendant in the hands of a third person are seized and used in satisfying the plaintiff's claim. This process is closely regulated by statute. It is most commonly used to secure the payment of a debt by seizing the wages of a debtor.

Gar'rick, DAVID (1717-1779), the most famous of English actors. He was born at Hereford, was given an education at a grammar school in London and after an unsuccessful attempt to learn the wine trade in Lisbon became a pupil of Samuel Johnson, with whom he remained for seven years. In 1736, with Johnson, he went to London and there studied law for a time. He had always had a leaning toward the stage, however, and in 1741 he appeared for the first time. As Richard III he made, under an assumed name, a great triumph, and from that time on his name was connected with the production of Shakespearean plays. Garrick presented these dramas without the barbarisms and crudities which had crept into them, and his work constituted a virtual revival of Shakespearean plays. Hot-tempered and jealous, he constantly made enemies among his colleagues and the critics, but his reputation as an actor remained unimpaired until his retirement from the stage in 1776. Among the dramas which Garrick wrote, the best is *The Lying Valet*.

Gar'risson, WILLIAM LLOYD (1805-1879), an American journalist and reformer, the founder of the antislavery movement in the United States. He was apprenticed to a shoemaker, but later became a compositor on the Newburyport *Herald*. In 1827 he became editor of the *National Philanthropist*, the first American temperance journal, and afterwards of a journal in support of the election of John Quincy Adams. With Mr. Lundy, a Quaker, he then started at Baltimore a paper called *The Genius of Universal Emancipation*, and his open denunciations of slave traders led soon to his imprisonment for libel. On his release he began lecturing in Boston and started *The Liberator*, a weekly journal, which he published with the aid of one assistant and a negro boy. In 1832 appeared his *Thoughts on African Colonization*, and in

the same year he established the American Antislavery Society. He subsequently visited England, where he was welcomed by Wilberforce, Brougham, Buxton and others. Constant threats were made that if he did not discontinue *The Liberator* he would be assassinated, and in 1835 he was saved with difficulty from a Boston



WILLIAM LLOYD GARRISON

mob; but his principles made steady progress until 1865, when the Antislavery Society was dissolved, with its work accomplished. A volume of his sonnets and one of selections from his writings have been published.

Garter, ORDER OF THE, the highest and most ancient order of knighthood in Great Britain, supposed to have been founded about 1344. Until the reign of Edward VI, the common title of the order was the Order of Saint George, and it still bears this title as well as that of the Garter. The emblem of the order, the garter, a dark-blue ribbon edged with gold, and bearing the motto *Honi soit qui mal y pense*—"Shame be to him who thinks evil of it," is worn on the left leg just below the knee.

Garter Snake, a name loosely applied to a number of different reptiles, which are found in various parts of North America. One species is found in all parts of the country. When mature it is about three feet long and is striped with yellow and black. Though its bite is quite harmless, it will rush at a pursuer with open mouth and present quite a terrifying appearance. It brings forth its young alive and

watches over them with great care, and it seems well established that the mother snake will allow her young to run into her mouth for protection until the danger has passed by.

Gary, IND., a city of Lake co., 23 mi. s. e. of Chicago, on Lake Michigan and on the Lake Shore & Michigan Southern and other railroads. The city is the site of the largest and most perfect steel plant in the world. Building operations were begun in 1906 by the Indiana Steel Company, a subsidiary company of the United States Steel Corporation. The plant contains exclusive ore docks on the lake shore, and furnaces whose combined capacity exceeds 2,500,000 tons of steel a year. There are also extensive car shops and other industries under separate management. Population in 1910, 16,802.

GARY SCHOOL PLAN, a course of study developed by Wm. A. Wirt, superintendent of public schools. It is the result of special conditions—the lack of equipment, and a large foreign population. The school day for pupils and teachers is eight hours. One-half of this time is given to the usual studies, one-fourth to domestic science, music, and manual arts, and one-fourth to physical training, games and plays. Above the third grade each subject is taught by a special teacher. There is no separate high school organization, and throughout the twelve-year course the pupil is allowed more freedom of action and thought than is customary in school. Another important feature is the small equipment needed, for while one portion of the children is on the playground another is in the classroom.

Gas, a term originally synonymous with air, but afterward restricted to such bodies as were supposed to be incapable of being reduced to a liquid or solid state. Under this supposition gas was "a term applied to all permanently elastic fluids or airs differing from common air." After the liquefaction of gases by Faraday, the old distinction between gas and vapor, namely, that the latter could be reduced to a liquid or solid condition by reduction of temperature and increase of pressure, while a gas could not be so altered, was no longer tenable, so that the term has resumed nearly its original signification and designates any substance in an elastic, air-like state. Gases appear to be in a continued state of compression, for when left unconfined they expand in every direction to an extent which has not yet been determined. In respect of this indefinite expansiveness, all gaseous bodies obey, more or less strictly, two laws. The first, known as the law of Boyle and Mariotte,

given first by Robert Boyle in 1662 and then by Mariotte in 1676, is, *The volume of a given mass of gas varies inversely with the pressure to which the gas is subjected*; or, in other words, the density of a given mass of gas is in direct proportion to the pressure to which the gas is subjected. The second, or Charles's law, may be stated as follows: *The volume of gas maintained under constant pressure increases for equal increments of temperature by a constant fraction of its original volume; and this fraction is the same whatever is the nature of the gas.* There is, however, no known gas that obeys these two laws perfectly.

The liquefaction of gases is effected by the application of cold or pressure, or of the two combined. For any given pressure there is a particular temperature at which the gas liquefies. At a certain point, however, called by Andrews the *critical point of temperature*, the distinction between liquid and gas appears completely lost. At and above this temperature no pressure that can be applied will convert the gas into the form of a liquid, even though the volume is diminished by pressure so much as to make the density of the gas greater than that of the liquid obtained at lower temperatures. By 1878 all gases had been liquefied.

The power of motion inherent in all parts of air-like matter is accounted for by the *kinetic theory of gases*, according to which a gas consists of an enormous number of molecules moving about with very great velocity. Great as is their number, however, the molecules are sparsely distributed through space, in comparison with their distribution when the substance is in the solid or liquid condition. A molecule of a gas flying about moves on in a straight line till it meets another molecule, or till it touches a side of the containing vessel. Meeting another molecule, the two turn each other aside, just as two billiard balls when they come into collision are both deflected from their previous paths. Passing thence, each flies on in a straight line till it meets a fresh molecule, and each is again deflected. When the molecules strike on the side of a vessel that contains the gas, they rebound as a billiard ball does from the cushion of the billiard table; and the perpetual shower of molecules that strike and rebound from the sides give rise to the phenomenon of gaseous pressure, just as an umbrella held out in a hailstorm is pressed downward, owing to the numerous impulsive blows that act upon it. When the temperature of a gas is raised the energy of the molecules is in-

creased. They strike with greater velocity, and the number of blows on the surface of the vessel is also increased. The pressure is therefore greater. The law of Dalton or Charles is easily shown to be a consequence of the kinetic theory. Boyle's law also follows very simply from it; for if we diminish the volume of the containing vessel to one-half, one-third, or to any other fraction of its original volume, we increase the number of molecules in a given space, a cubic inch for instance, in the same ratio. Consequently, the number of impacts on a square inch of the surface of the containing vessel will also be increased in the same ratio, and the pressure will thus be increased in that ratio, too.

Gas, ILLUMINATING, a gas made from bituminous coal or oil and used for illuminating purposes. Illuminating gas was first successfully used by William Murdoch, a Scotchman, in 1792. In 1805 he introduced it into the cotton mills of Manchester, England. It was first used in Paris in 1799, and in London in 1810. It was introduced into the United States at Baltimore in 1821. The next year it was used in Boston, and in 1825 was introduced into New York.

Illuminating gas in general use is known as coal gas or water gas, according to the method employed in its manufacture. Both varieties when manufactured contain many impurities, consisting of tar, sulphur compounds, ammonia, carbon dioxide and water vapor. All of these must be removed before the gas is suitable for use, and the greater part of the apparatus in gas works is for the purpose of removing these impurities.

COAL GAS. Coal gas is made by distilling bituminous coal, those varieties containing a large proportion of volatile matter being the most desirable. In the United States the best gas coal is obtained near Pittsburg, Pa., and in West Virginia. The apparatus for the manufacture of coal gas, which is shown in the illustration, consists of the following parts: The furnace, 1, containing the retorts; the hydraulic main, 2, into which the gas flows from the retorts; the exhauster, 3; the condenser, 4; the scrubber, 5; the purifier, 6; the station meter, 7; the holder, 8; the governor, 9; the main, 10. The retorts are made of fire clay and are flat on the bottom and round on the top. They are usually nine feet long, twenty-six inches wide and sixteen inches high and have on the front end a cast iron mouthpiece fitted with a gas-tight door, also a delivery tube through which the gas flows. The retorts hold from 250

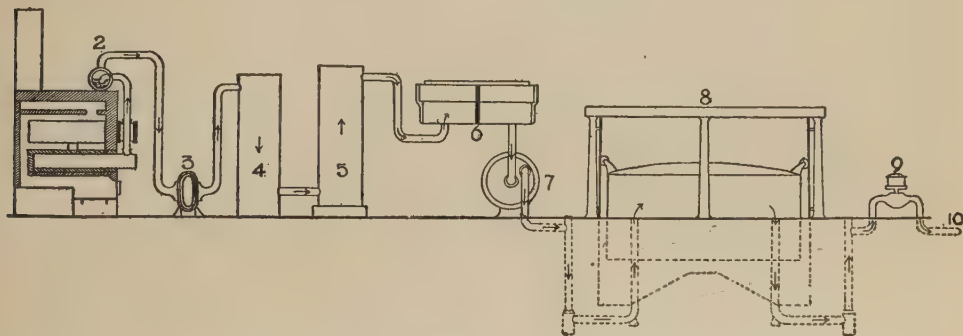
to 350 pounds of coal each. They are placed on shelves in the furnace so that the fire will surround them. There are usually six in a furnace. The delivery pipe leads to the hydraulic main, which is a large U-shaped pipe containing water.

The retorts are charged with coal, then closed and heated to redness. As the coal distills, the gas flows to the hydraulic main, where it passes through water and loses some of its tar and ammonia. It is drawn from the hydraulic main and forced through the remaining parts of the apparatus by the exhauster, which is a large gas pump operated by steam power. The condenser (4) is a large cylinder containing coils of iron pipe through which cold water is kept flowing. As the gas passes through this cylinder it is cooled and loses its tar and water vapor. From the condenser it goes to the scrubber (5), which is another cylinder filled with coke, brushes, wooden grids or other porous material,

upon the pillars of which guide pulleys run as the tank moves up and down. From the holder the gas passes through the governor (9), which is a device for controlling the pressure, to the main (10), from which it is distributed to the consumer. As the gas enters the building in which it is to be used, it passes through a meter which registers the number of cubic feet consumed.

WATER GAS. Water gas is now in very general use in large cities. It is made by mingling the vapor of crude petroleum with steam and heating the mixed vapors to a high temperature. It contains the same impurities as coal gas and for its manufacture passes through the same process of purification. It is more cheaply made than coal gas and in the main is more satisfactory to the consumer.

OIL GAS is made by running oil or petroleum through red-hot tubes. This is the gas generally



over which a shower of water constantly flows. The gas enters the scrubber at the bottom and as it passes up through the cylinder it is brought in contact with the water, which absorbs any ammonia and deposits any tar that may have escaped the condenser. From the scrubber the gas passes to the purifier (6), which is a chamber containing layers of freshly slaked lime or of oxide of iron. These are placed one above the other on floors containing many small openings. As the gas is forced up through the lime or oxide, these compounds absorb any sulphur compounds which it may contain. It is now ready for use and passes through the station meter (7), which measures and records the number of cubic feet passing into the holder (8). The holder is a large cylindrical tank, made of thin iron plates having a dome-shaped top and open at the bottom. It is placed in a cistern of water from which it rises as it is filled with gas. The tank is surrounded by an iron frame, called the *guide*

used in lighting railway cars. It is stored in iron cylinders, under a pressure which enables each cylinder to contain a supply sufficient for several days.

Gas'cony, an old duchy in France, between the River Garonne, the sea and the Pyrenees Mountains. It composes three departments and parts of four others. The Gascons, who are of mixed Basque and Gothic descent, used to have the character of being brave, faithful and peculiarly tenacious of purpose, but much given to boasting, whence the word *gasconade*.

Gas Engine, an engine in which the motive power is produced by the explosion of gas in a cylinder carrying the piston. Illuminating gas, natural gas and that from gasoline, naphtha or other petroleum products are used, but by far the largest number of engines use gasoline gas and are known as *gasoline engines*. The important parts of a gas engine are the cylinder, the piston, the connecting rod, the crank, the fly

wheel, the igniting apparatus and the necessary valves for the admission and escape of gas from the cylinder.

In the common type of engine the action is as follows: The proper quantity of gas, mixed with air, is admitted to the cylinder. By means of the igniting apparatus, this is exploded by an electric spark, thus throwing the piston forward with a pressure varying from 100 to 150 or 175 pounds to the square inch. As the piston moves forward it creates a partial vacuum in the cylinder, and more gas is drawn in. On the return of the piston this is compressed in the head of the cylinder, where it is exploded, giving the piston another forward movement. With the second return of the piston the exhaust valve is opened and the burned gas is forced out. It requires two revolutions of the engine shaft to complete the cycle. Because of the irregular application of power, the gas engine is compelled to carry a heavy fly wheel, in order to maintain a uniform rate of motion. A governor attached to this wheel regulates the supply of gas and the number of explosions in the cylinder. Gas engines are used for a great variety of purposes and are constructed of nearly all sizes up to 700 horse power. A portable pattern, built on a wagon so that it can be hauled from one place to another, is of great advantage to farmers. The gas engine is simple in construction, does not require a boiler, can be used without any danger of explosion and can be operated without the services of a skilled engineer. See STEAM ENGINE.

Gas'kell, ELIZABETH CLEGHORN (1810-1865), a British novelist, daughter of William Stevenson. She married in 1832 the Rev. William Gaskell, a Unitarian minister at Manchester. Her works comprise many novels, among them *Ruth*, *Cousin Phillis* and *Cranford*, this last a classic. Her *Life of Charlotte Brontë* is one of the finest of English biographies.

Gasoline, *gas'o leen*, a highly inflammable liquid produced in the distillation of crude petroleum or by the distillation of bituminous coal. It is colorless, volatile and highly explosive. Gasoline is used in gas engines, where, by means of a carburetor, it is transformed into a gas that furnishes the power. See PETROLEUM.

Gas Tar. See COAL TAR.

Gastric Juice, a clear, colorless, acid fluid, with a salty taste, secreted by the mucous membrane of the stomach and acting as the chief agent in the process of digestion. Its most active elements are hydrochloric acid, pepsin and rennin. The first gives the juice its acidity,

makes the other two elements more active, prevents decaying of the food, dissolves proteids and softens connective tissue; the rennin curdles milk; the pepsin changes proteids into peptones. Gastric juice does not act on oil or starch. After the food has become thoroughly mixed with the juice of the stomach, it is a thick, sticky substance, called *chyme*, ready to pass into the intestines. The amount of gastric juice secreted daily in the human adult is estimated to be fourteen pounds or more, but as it is continually re-absorbed, there is no great quantity present at any one time.

Gastri'tis, a disease which has its seat in the mucous membrane of the stomach. It takes several forms, in all of which, however, the symptoms are generally similar—a slight pain in the stomach, accompanied by severe headache, slight fever and often nausea. Diet and careful hygiene are found to constitute the most successful treatment.

Gas'tropod or **Gas'teropod**, one of a class of mollusks which have a single shell, although some of the group are wholly without shells. See SLUG; SNAIL; MOLLUSCA.

Gates, HORATIO (1728-1806), an American officer during the Revolutionary War, born in Essex County, England. He entered the English army and was with Braddock when the latter was defeated in 1755. On the conclusion of peace he purchased an estate in Virginia, where he lived until the Revolutionary War. He was appointed adjutant general by Congress, with the rank of brigadier general, and at the head of the American Army of the North he compelled the British general Burgoyne to surrender his whole army at Saratoga (1777). The chief credit for this victory belongs, however, rather to Schuyler, Arnold and Morgan than to Gates. In 1780, after the capture of General Lincoln, Gates received the chief command of the southern districts, but was defeated two months later by Cornwallis at Camden. He was then superseded by General Greene and brought to court martial, but was finally acquitted and was reinstated in his command in 1782, after the capture of Cornwallis. At the close of the war he retired to his farm in Virginia; in 1790 he removed to New York, where he died.

Gates, THOMAS, Sir (?-about 1621), the first governor of Virginia Colony under the Virginia Company. He was born in Devonshire, England, entered the army and saw service under Sir Francis Drake. He was one of the principal promoters of the Virginia Company in 1606 and

was placed in joint command, with Somers and Newport, of the fleet that sailed for America in 1609 to relieve the distressed colony. His vessel was wrecked on the Bermudas, but two new ships were constructed, and Gates arrived at Jamestown in 1610, just at the close of the famous "starving time." Gates yielded to the entreaties of the colonists and put them aboard ship for England, but turned back on account of the arrival of Lord Delaware. He made a later trip to England, where he served in responsible positions.

Gath (wine press), one of the five royal cities of the Philistines, which, from its situation on the borders of Judah, was of much importance in the wars of the Jews and Philistines. It was the native town of Goliath, and was successively captured by David, Hazeel and Uzziah, who dismantled it. The site cannot be determined with certainty, but it is sometimes identified with Tell-Sâfieh, between Ekron and Ashdod.

Gatineau, *gah te no'*, a river of Canada, in Quebec province, the largest affluent of the Ottawa. It rises in several lakes and flows almost due south, entering the Ottawa nearly opposite Ottawa City. It is not navigable more than five miles above the Ottawa, except by canoes, but its rapid waters are well stocked with fish and are available as water power. Its length is 400 miles.

Gat'ling, RICHARD JORDAN (1818-1903), an American inventor, born in North Carolina. He showed mechanical skill at an early age and perfected several machines for the simplification of processes in cotton manufacture. His principal invention, however, was the revolving gun now known as the Gatling gun. See MACHINE GUN.

Gauchos, *gow'choze*, natives of the Pampas in the La Plata countries in South America, of Spanish descent. They are noted for their spirit of wild independence, for horsemanship and for their expert use of the lasso. Their mode of life is rude and uncivilized, and they depend for subsistence chiefly on cattle raising.

Gau'dea'mus, (Latin, "let us rejoice"), the title and first word of a Latin song, popular among students in Germany and America. It dates perhaps from the fifteenth century.

Gauge or **Gage**, *gaje*, STEAM and WATER, the instruments fixed to engine boilers for registering the force of the steam and the level of the water. The steam gauge consists of a cylindrical metallic box with a dial in front, over which a needle moves. A tube from the boiler connects with a

movable piece of metal, which acts against a spring, gauged to indicate the pressure to the square inch in pounds. The higher the pressure, the more the spring is compressed. The needle is connected with the spring by a mechanism which causes it to move over the dial, upon which the pressure is marked in pounds. The water gauge is a vertical glass tube or flat case, communicating above and below with the boiler. Gauge cocks are sometimes used instead of or in addition to the tubes, for enabling the engineer to verify the level of the water. See BOILER.

Gaul, in ancient geography the country of the Gauls, the chief branch of the great original stock of Celts (See CELTS). It extended at one time from the Pyrenees to the Rhine and included also a part of Italy. Hence it was divided into Gaul on this side (the Roman side) of the Alps, or *Cisalpine Gaul*, and Gaul beyond the Alps, or *Transalpine Gaul*. Latterly the former was regarded quite as part of Italy, and the name was restricted to Transalpine Gaul, or the country corresponding nearly to modern France. Julius Caesar found Transalpine Gaul divided into three parts: Aquitania, extending from the Pyrenees to the Garonne; Celtic Gaul, from the Garonne to the Seine and Marne, and Belgic Gaul, in the north, extending to the Rhine.

Migrations among the Gauls about 397 B. C. first bring the Gallic nation into the region of history. Having crossed the Alps, they fell upon the Etruscans, defeated the Romans at Allia (390 B. C.) and sacked and burned Rome. More than a century after the burning of Rome, the eastern Gauls made three destructive irruptions into Macedonia and Greece. Several tribes pursued their course into Asia Minor, where, under the name *Galatians*, they long retained their national peculiarities. After these migrations the Gauls along the banks of the Danube and in the south of Germany disappeared.

The Celts of Cisalpine Gaul continued formidable to Rome until after the first Punic War, when the nation was compelled as the result of a war of six years to submit to the Romans (220 B. C.). When Hannibal marched on Rome they attempted to shake off the yoke; but the Romans, victorious over the Carthaginians, reduced them again to submission. In the years 128-122 B. C. the Romans conquered the southern part of Transalpine Gaul, along the sea from the Alps to the Pyrenees, and here established their dominion in what was called the Province, a name that still exists as Provence. When Julius Caesar was appointed to the proconsulship over

the countries bordering on Gaul, he resolved to subject all Gaul and executed his purpose in less than nine years, 58-50 B. C., in eight bloody campaigns.

Gauntlet or **Gantlet**, *gahnt'let*, a glove, usually made of leather and covered with iron, which was used by medieval knights. The metal parts were so joined that the hand could open and close. To throw down the gauntlet before an antagonist was a common method of declaring a challenge.

Gaur, *gowr*, or **Gour**, one of the largest of the ox tribe, remarkable for the height of its spinal ridge and for its white "stockings," which reach above the knee. It is so fierce when aroused that neither tiger, rhinoceros nor elephant dares attack it. The hide on the shoulders and hind quarters is sometimes nearly two inches in thickness, even after being dried, and it is, therefore, much valued for shields. The gaur is an inhabitant of India, and it is said that it cannot be domesticated.

Gautama, *gow'tah mah*. See BUDDHA.

Gautier, *go tyay'*, THEOPHILE (1811-1872), a French poet, novelist and critic. His first volume of poems, published in 1830, marked him as a romanticist of the school of Hugo. His first great success was secured by publication of the romance *Mademoiselle de Maupin*. He was afterward engaged as theatrical and art critic on the *Revue de Paris*, the *Artiste*, the *Moniteur* and the *Journal Officiel*. Among the most interesting of his productions may be ranked his *Journeys in Spain; Italy and Constantinople*, narratives of travel; *Captain Fracasse* and *Handsome Jenny*, novels; the brilliant short stories, *Fortunio* and *Jettatura*; his criticisms, collected in *History of Dramatic Art in France*, and *Enamels and Cameos*, his best volume of verse, on which his reputation chiefly rests.

Gavarni, *ga vahr nee'*, (1804-1866) the assumed name of Sulpice Paul Chevalier, a celebrated French caricaturist, born at Paris. His success came after 1832, when he produced some notable illustrations in several journals of Paris. Most of his subjects are taken from low life, as seen in the Bohemian quarters of Paris, and they are represented with force and vivacity. In 1847 he visited England, and the sketches which he sent from Saint Giles, London, to *L'Illustration* created an immense sensation. He afterward illustrated Eugene Sue's *Wandering Jew*, Balzac's novels and other works.

Ga'vial, the Indian crocodile, characterized by the narrow, almost cylindrical jaws, which

form an exceedingly long muzzle. The teeth, about 120 in number, are all equal in length, and the feet are completely webbed. The males can be distinguished from the females by the



GAVIAL

large lump upon the snout, in which the nostrils open. The only living species, which sometimes reaches a length of twenty feet, is found in southern and eastern Asia, especially in the Ganges. It feeds on fishes and other small prey.

Gavotte, *ga vol'*, a musical air for a special dance, consisting of two strains, each of four or eight bars, in $\frac{3}{4}$ or $\frac{4}{4}$ time, the starting notes occupying half a bar. Like the minuet, it has been introduced for free treatment into complex musical compositions. The name is said to be derived from the Gavots, the inhabitants of the Gap, in France.

Gay, JOHN (1685-1732), an English poet. In his youth he was apprenticed to a silk mercer in London, but he soon gave up that work. In 1711 he published his *Rural Sports*, which was followed by several pastoral poems, written under the influence of Pope. In 1715 appeared his burlesque drama of *What d'ye Call It?*, followed by *Trivia, or the Art of Walking the Streets of London*. His next piece, a farce entitled *Three Hours after Marriage*, failed entirely, but *The Captive*, a tragedy produced some years later, met with some success. His reputation was greatly increased by the publication of his *Fables* in verse, but it was not until the appearance of the *Beggar's Opera* that he became really famous. This was first acted in 1727, at Lincoln's Inn Fields, where it ran for sixty-three nights, but the lord-chamberlain refused to license for performance a second part, entitled *Polly*.

Gay, SIDNEY HOWARD (1814-1888), an American journalist and author, born in Hingham, Mass. In 1842 he joined the staff of the *New York Tribune*, of which, from 1862 to 1866, he was managing editor. He occupied the same position on the *Chicago Tribune* for three years and was later connected with the *New York Evening Post* as an editorial writer. He collaborated with William Cullen Bryant in the writing of *A Popular History of the United States*, but he practically wrote all of that work.

Gay-Lussac, *gay'lu sak'*, LOUIS JOSEPH (1778-1850), an eminent scientist, educated at the Ecole Polytechnique, Paris, in which institution he became assistant chemist upon his graduation and eight years later was appointed professor of chemistry. He was one of the most noted scientists of his day and made many important discoveries, some of which revolutionized the theories and practices of chemistry. Perhaps the most important of all was the discovery that oxygen and hydrogen unite in proportions of one to two to form water. This led to the discovery and announcement of the law of volumes, which is one of the most important discoveries in the domain of chemistry (See **CHEMISTRY**). He gave attention to the application of chemical laws and theories to practical purposes. Owing to the great benefits resulting from his studies and discoveries, Gay-Lussac was the recipient of many honors. He also occupied important educational and government positions and in 1839 was made a peer of France.

Gaynor, WILLIAM JAY (1851-1913), an American jurist, born in Whitestown, N. Y., and educated at Whitestown Seminary and in Boston. He began his career as a journalist, but was admitted to the bar in 1875. He was very successful in his practice and appeared in many important cases. In 1903 he was elected judge of the Supreme Court of New York and in 1909 he was elected mayor of Greater New York.

Gaza, *gah'za*, an ancient town of Syria, 3 mi. from the Mediterranean and 50 mi. s. s. w. of Jerusalem. It was once the most important city of the Philistines, who had conquered it from Egypt. Later it was taken by Alexander the Great, and it was destroyed in 96 B. C.; but it continued a center of Greek culture until nearly 700 A. D. The modern city of Ghazzeh is an important station in the caravan communication between Egypt and Syria. Population in 1911, about 40,000.

Gazelle, *ga zel'*, a small, graceful antelope, of which there are about twenty-three species. The

color of its back is a light fawn, deepening into dark brown in a wide band which edges the flanks and forms a line between the upper portions of the body and the pure white of the abdomen. The eye of the gazelle is large, soft and lustrous. Both sexes are provided with horns, which are round, black and about thirteen inches long. It seems to be confined to the north side of the Atlas Mountains, Egypt, Abyssinia, Syria, Arabia and South Persia. The common gazelle, sometimes called the *ariel*, or *dorcas*, is brown in color. It is easily tamed and is a great favorite as a pet. Other species are Loder's gazelle, Grant's and the Indian chinkara, or ravine deer. See **ANTELOPE**.

Gazette, *ga zet'*, (from *gazetta*, a small Venetian coin, which was the price of the first newspaper), a newspaper, especially an official newspaper. The first gazette in England was published at Oxford in 1665. On the removal of the court to London the title of *London Gazette* was adopted. Later this paper became the official organ of the government. The term is frequently applied to newspapers in the United States. See **NEWSPAPER**.

Gearing, *geer'ing*, in machinery, the parts, collectively considered, by which motion communicated to one portion of a machine is transmitted to another, generally a train of toothed wheels. There are two chief sorts of wheel gearing, *spur gearing* and *beveled gearing*. In the former the teeth are arranged round either the concave or convex surface of the wheel, and are of equal depth throughout. In *beveled gearing* the teeth are placed upon a beveled surface round a wheel, which, if the slope of the bevel were continued, would form a cone, the teeth sloping similarly. Spur gearing is used when the axles of the wheels are parallel, and beveled gearing is used when the axles are at right angles to each other.

Geary, *ga'ry* or *ge'ry*, JOHN WHITE (1819-1873), an American soldier and politician, born in Westmoreland County, Va., and educated at Jefferson College. He engaged in commercial and engineering work and during the Mexican War served in the United States army, becoming colonel. At the close of the war he settled in San Francisco, became its first mayor under the American system of government and took a conspicuous part in preparing the state for admission to the Union. Later he returned to Pennsylvania and in 1856 was appointed territorial governor of Kansas. There, by his tact and firmness, he brought order out of confusion and

dissension, but, disgusted at his lack of support from the Federal government, he resigned upon the accession of Buchanan. During the Civil War he served with distinction in the Army of the Potomac, fought at Cedar Mountain, Chancellorsville, Gettysburg, Lookout Mountain, and with Sherman upon his march to the sea, and was appointed military governor of Savannah after its capture. At the close of the war he was brevetted major general. In 1866 Geary became governor of Pennsylvania as a Republican and was reelected in 1869. He died a few days after the expiration of his term.

Geber, *ga'bur*, an Arabian chemist or alchemist, often designated the father of chemistry, who flourished during the eighth century. He was acquainted with nearly all the chemical processes in use down to the eighteenth century. His writings describe various kinds of furnaces and other apparatus, besides distillation and other chemical processes; the purification, composition and properties of the metals then known—gold, silver, copper, lead, tin and iron—and the functions of mercury, sulphur and arsenic. He is the reputed author of an immense number of works, as well on metaphysics, language and astronomy, as on chemistry.

Geck'o, a name common to the members of a family of lizards that are active by night and are characterized by a general flatness of



GECKO

their bodies and heads, which have a somewhat triangular shape. The body is covered on the upper part with numerous round warts; the feet are rather short, the toes of nearly equal length and furnished with flattened sucking pads, by means of which the animals can run up a perpendicular wall or even across a ceiling after the manner of flies. The gecko receives its name from its peculiar cry. Species are common in North Africa and South Europe.

Geez Language. See ETHIOPIA LANGUAGE.

Gehen'na or **Valley of Hin'nom** lies southwest of Jerusalem and was celebrated as

a place of idolatrous rites and where children were sacrificed to Molech. After the time of Josiah, king of Judah, it became a place for sewage and filth. In the time of Christ the word Gehenna was synonymous with hell, the place of the lost.

Geibel, *gi'bel*, EMANUEL (1815-1884), a German poet. He studied at the universities of Bonn and Berlin and resided a year or two in Greece. He published in 1840 his first collection of poems, which reached its hundredth edition in 1884. From 1852 to 1869 he was honorary professor of aesthetics and poetry in the University of Munich, but spent his latter days in his native town. He wrote *Brunhild*, a tragedy; *The Loreley*, an opera, and several other plays, but his fame rests on his lyrics, which are immensely popular.

Geikie, *gee'ky*, ARCHIBALD, Sir (1835-), a British geologist, born in Edinburgh. After graduation at the University of Edinburgh he became a member of the Geological Survey of Scotland, of which he was later made director. Having served for eleven years as Murchison professor of geology and mineralogy in Edinburgh, he became director of the Museum of Practical Geology in London. Geikie is considered one of the highest geological authorities and has written extensively on the subject of physiography and geology, his text-books being used in both England and the United States. He was elected president of the Geological Society of London and also served as president of the British Association for the Advancement of Science. In 1897 he came to America and delivered a series of lectures at Johns Hopkins University. Among his important works are *A Text-book of Geology*, *Ancient Volcanoes of Britain* and *The Foundations of Geology*.

Geissler's, *gise'hurs*, **Tubes** or **Vacuum Tubes**, tubes made of very hard glass, containing highly rarefied gases, as air, oxygen or nitrogen. Each end of the tube has a platinum wire sealed into it, to serve as an electrode. When a discharge of electricity is caused to take place in these tubes, by connecting the electrodes to the terminals of a Ruhmkorff's coil or a Holtz's machine, very brilliant effects may be produced. See CROOKES TUBES.

Gelatin, *jel'a tin*, an animal substance closely resembling glue. It is confined to the solid parts of the body, such as tendons, ligaments, cartilages and bones, and exists nearly pure in the skin, but it is not contained in any healthy animal fluid. Its leading character is

the formation of a jelly when its solution in boiling water cools. Gelatin does not exist as such in the animal tissues, but is formed by the action of boiling water. The coarser forms of gelatin, from hoofs and hides, are called *glue*; that from skin and finer membranes is called *size*, and the purest gelatin, from the air bladders and other membranes of fish, is called *isinglass*. Gelatin is a nutritious article of food, and as part of the diet in hospitals it produces the best effects; but animals fed exclusively on it die with the symptoms of starvation, as it cannot yield albumen, fibrin or casein. The combination of tannin with the gelatin in hides changes them to leather, and it is upon this principle that the art of tanning depends. See GLUE; TANNING.

Gelée, *zhe la'*, CLAUDE (1600-1682), a French landscape painter and etcher, generally known as Claude Lorrain. After studying in Naples and Rome, he traveled through Germany and France, then returned to Italy and settled in Rome, where he enjoyed the patronage of the popes Urban VIII and Clement IX. Among his famous paintings are the *Embarcation of Saint Ursula*, in the National Gallery, London; the *Finding of Moses*, in the Madrid Gallery; the *Expulsion of Hagar*, at Munich, and the *Village Dance* and the *Landing of Cleopatra at Tarsus*, in the Louvre, Paris. His pictures are noted for the brilliant effects of light reflected in the sky, clouds and water and for the poetic feeling shown in the interpretation of nature.

Gelsemium, *jel se' mi um*, or **Yellow Jasmine**, a shrub of the Southern states, with opposite, lance-shaped, shining leaves and sweet-scented yellow flowers. The root is poisonous, but has valuable medicinal properties, being used for controlling certain forms of nervous irritability.

Gemini, *jem'i ni*, (the twins), a constellation, so named from its two bright stars, Castor and Pollux. Gemini is the third sign of the zodiac. The sun is in the constellation of Gemini from the twenty-first of May to about the twenty-first of June. The symbol of Gemini is Π .

Gems, *jenz*. See PRECIOUS STONES.

Gems, ARTIFICIAL. The great value of gems led to their imitation in the earliest times. The Egyptians, who understood the art of coloring glass, made excellent imitations of the most costly precious stones known to them. The Romans used powdered rock crystal in imitating gems, and their counterfeits were so successfully made that it was difficult to distinguish them

from the genuine article. The alchemists of the Middle Ages also produced excellent imitations of the emerald, ruby, sapphire and topaz.

Modern imitations are of glass, usually known as *paste* or *strass*. This glass contains a large proportion of oxide of lead in its composition, and this makes it remarkably clear and brilliant. It is colored to imitate the most highly-prized precious stones, by the same process that is used in making colored glass (See GLASS, sub-head *Colored Glass*). When clear, paste resembles the diamond, but it is soft and can be easily scratched, so that by testing it with a quartz crystal or piece of hard steel, it is easily detected. Imitations are also produced by using cheaper stones, having close resemblance to the genuine. Clear quartz and white Brazilian topaz, as well as colorless varieties of the sapphire and emerald, are often sold for diamonds. Cheap stones are also colored to resemble carnelians and agates. All of these imitations are skillfully prepared, and one not conversant with the methods of testing gems is liable to be deceived if he makes purchases of unreliable dealers.

Diamonds and rubies have been successfully made by chemical process. The product was genuine, but the stones were all very small and the experiments were attended with so great expense as to make their production impracticable for commercial purposes.

Gendarmes, *zhahN dahrm'*, the name originally given in France to the whole body of armed men, but after the introduction of standing armies to a body of heavy-armed cavalry, which composed the chief strength of the forces. Gendarmes are now the French armed police. There are *horse gendarmes* and *foot gendarmes*.

Gen'eraliza'tion, the act of inferring the characteristics of a class of things from observation of the qualities of one or more members of the class. For example, we generalize when, having noted the same characteristics in the cat, the tiger and the lion, we assert that these characteristics are peculiar to the genus to which the three animals belong. The term *generalization* is applied not only to the act but to the product of inductive reasoning. Corresponding to this process of thought, which more fully determines class attributes, is an extension of the meaning and application of the term that names the class. See APPERCEPTION; CONCEPT.

Genesee, *jen e see'*, **River**, a river which rises in Potter co., Pa., flows north through New York and falls into Lake Ontario, 6 mi. below Rochester, after a course of 145 miles

It is notable for its varied and romantic scenery and its extraordinary falls. These falls are five in number; three of them occur about 90 miles from the mouth of the river and are respectively 60, 90 and 110 feet high. The other two are near Rochester and are both about 100 feet high.

Genesis, *jen'e sis*, (creation, birth, origin), the first book of the Bible and of the Pentateuch. It received this name from the Greek translators. *Genesis* consists of two great but closely connected divisions: 1, The history of the creation, the fall of man, the flood, the dispersion of the human race; 2, the history of the fathers of the Jewish race.

Genet, *zha na'*, EDMON CHARLES EDOUARD (1765-1834), a French diplomat, born at Versailles. He served in minor diplomatic posts until 1781, when he succeeded his father as chief of the bureau of correspondence in the department of foreign affairs. During the Revolution, Genet was in sympathy with the Girondists and became ambassador to Holland in 1792, but in the following year he was made minister plenipotentiary to the Congress of the United States. Landing at Charleston, S. C., in April, he was enthusiastically received as a representative of a people striving for liberty, and his open efforts to secure recruits for the conquest of Louisiana were successful. However, he also began to give commissions to privateers, thus clearly leading the United States to violate its neutrality between France and England. Consequently, President Washington and Secretary of State Jefferson notified him that his activity must cease. He disregarded this warning, however, until his recall was demanded of the French government. This occurred in 1794, but Genet did not return to France. He became a naturalized citizen and settled in New York, where he married a daughter of Governor George Clinton.

Gene'va, *je ne'va*, a town of Switzerland, capital of the canton of the same name, at the western extremity of Lake Geneva, where the Rhone issues and divides the town into two portions, the larger and more important of which is on the left, or south, bank. It was formerly surrounded by walls and regular fortifications, but since 1850 these have been removed. The town is divided into two parts, an upper and a lower. The upper town consists of well-built houses and handsome hotels; the lower town is the seat of trade and the residence of the poorer classes. The most important buildings are the cathedral, or Church of Saint Peter

(built in the eleventh century); the townhouse; the Musée Fal; and Musée Rath and the university building. The only important manufactures of Geneva are those of watches, musical boxes and jewelry, of all of which it produces about \$10,000,000 annually. Geneva has ample railway communication and is one of the principal entrances for tourists and travelers into Switzerland. In literature and science it has long occupied a distinguished place, and it has been the birthplace or the residence of many eminent men, including Calvin, Knox, Le Sage, Necker, Rousseau and Sismondi. Population in 1910, including suburbs, 125,520.

The canton of Geneva has an area of 109 square miles, and is in the basin of the Rhone. The only streams of importance are that river and the Arve. Abundant crops of all kinds suitable to the climate are raised, and the whole territory has the appearance of a garden. Its constitution is the most democratic in the federation. It embodies the referendum and provides for compulsory arbitration of labor disputes by especially organized courts. Population in 1910, 154,159.

Geneva, N. Y., a city in Ontario co., 52 mi. s. e. of Rochester, on Seneca Lake, on the Seneca & Cayuga Canal and on the New York Central, the Lehigh Valley and other railroads. It has a beautiful location above the lake and is the seat of Hobart College and of the state agricultural experiment station. There are manufactures of stoves, boilers, optical supplies, cereals, and other articles, besides very extensive nurseries. It was chartered as a city in 1898. Population in 1910, 12,446.

Geneva, LAKE, or **Lake Lemán**, the largest of the Swiss lakes. It has the form of a crescent and is traversed by the river Rhone. Its length is 45 miles, its greatest width 8 miles and it is 1150 feet above the sea. Its waters are of a beautiful blue color, the scenery on its shores is remarkably beautiful and the region is visited yearly by thousands of tourists.

Geneva Arbitra'tion, the arbitration of a controversy between the United States and Great Britain, growing out of the activity of the privateer *Alabama* against the American commerce during the Civil War (See **ALABAMA CLAIMS**). The tribunal was provided for by the Treaty of Washington in February, 1871.

Geneva Convention, the name given to an agreement made between various European powers which met in 1864 at Geneva. It provided for the care of the sick and wounded in

time of war, regardless of nationality, and specified that hospitals and ambulances should be regarded as neutral so long as they had sick or wounded in them; it declared that all persons engaged in caring for the sick and wounded should be regarded as neutral; that any family which received and cared for sick soldiers should be by that fact absolved from the necessity of quartering troops; that wounded men should be allowed, when cured, to return to their own country on condition of not bearing arms during the remainder of the war, and that a badge consisting of a red cross on a white ground should be the distinguishing mark of all ambulances and hospitals, as well as of the staffs. This convention has now been agreed to by all the European powers, as well as by Persia. See RED CROSS SOCIETIES.

Genghis Khan or **Jenghis Khan**, *jen'gis kahn'*, (1162-1227), the first great Mongol conqueror. He succeeded his father when only fourteen years of age and made himself master of the neighboring Mongol tribes. After much terrible warfare with various Tartar tribes, he was proclaimed khan of the united Mongol and Tartar tribes. The conquest of China occupied the Mongols more than six years. The capital, then called *Yenking* (Pekin), was taken by storm in 1215 and plundered. Bokhara and Samarcand, two cities in Turkestan, were stormed, pillaged and burned. In 1225 Genghis marched in person at the head of his army against the king of Tangut (southwestern China), who had given shelter to two of his enemies and had refused to yield them up. A great battle was fought, in which the king of Tangut was totally defeated. The victor remained some time in his newly conquered provinces, while two of his sons went to complete the conquest of northern China. At the death of Genghis his immense dominions were divided among his four sons.

Genii, *je'ni i*, tutelary deities, the ruling and protecting powers of men, places or things. According to the belief of the Romans, which was common to almost all nations, every person had his own genius; that is, he had a spiritual being, which introduced him into life, accompanied him during the course of it and again conducted him out of the world at the close of his career.

Gennesaret, *jen nes'sa ret*, LAKE OF, or **Sea of Galilee**, a fresh-water lake in Central Palestine, 13 mi. long and 7 mi. broad. It is traversed by the Jordan in its upper course. On the east the coasts are nearly 2000 feet high and are

deeply furrowed by ravines, though they are flat along the summit. At the time of Christ there were on its shores nine flourishing cities, of which seven are now uninhabited ruins, while Magdala and Tiberias are both in a poverty-stricken condition.

Genoa, *jen'o ah*, a seaport of North Italy, the chief commercial city of the kingdom, on the coast of the Mediterranean. It is beautifully situated at the foot and on the slope of the Ligurian Alps. It is enclosed by extensive fortifications, and the heights around are crowned with detached forts. In the older parts of the town the streets are extremely narrow and have lofty buildings. In the newer quarters many avenues are spacious and are lined with palaces and other noble edifices. The finest streets are the Via Balbi, Via Garibaldi, Via Roma and the avenue Via di Circonvallazione. The principal buildings are the ducal palace, the townhall, the Palazzo Reale and the palaces of Doria, Serra, Cambasio, Balbi and Durazzo. The most remarkable of the churches are the Duomo, or Cathedral of San Lorenzo; Santa Maria in Carignano; Santo Stefano; Santo Ambrogio, and the Annunziata. The principal charitable institution is the Albergo de Poveri, and others are the Ospedale del Pammatone and a hospital recently built by the Galliera family. Among the theaters of the city may be mentioned the Teatro Carlo Felice. Besides the university the chief educational institutions are the theological seminary, the school of fine arts, the royal marine school and the navigation school. The manufactures of Genoa include cotton and silk goods, velvets, gold, silver, paper and leather goods, sugar and preserved fruits.

Under the Romans Genoa was famous as a seaport. After the breaking up of the empire of Charlemagne, it constituted itself a republic, presided over by doges. From 1119 it was almost constantly at war with Pisa down to 1284, when Genoa inflicted a crushing defeat on Pisa. The rivalry between Genoa and Venice was a fruitful source of wars during the twelfth and fourteenth centuries. Meanwhile, the city was internally convulsed by civil discord and party strife. In the absence of internal tranquillity, the city sometimes submitted to a foreign yoke in order to get rid of anarchy. In 1528 the disturbed State regained tranquillity and order, which lasted till the end of the eighteenth century. The form of government established was a strict aristocracy. Little by little Genoa lost all her foreign possessions. Corsica, the last of

all, revolted in 1730 and was ceded in 1768 to France. In 1797 a democratic constitution was adopted, and the Ligurian Republic was formed. After the Battle of Marengo (1800) Genoa was taken possession of by the French. In 1805 it was formally annexed to the empire of France and ten years later, to the kingdom of Sardinia, with which it has become a portion of the kingdom of Italy. Population in 1911, 272,077.

Genseric, *jen'sur ik*, a king of the Vandals, who, having obtained joint possession of the throne of Spain, with his brother Gonderic, crossed the Straits of Gibraltar with 50,000 men in 429, on the invitation of Bonifacius, the Roman governor of Africa, to assist him against the Moors. He, however, soon declared his independence, and, having completely defeated Bonifacius, founded a kingdom, which, in 439, had its seat at Carthage. See VANDALS.

Gentian, *jen'shan*, a large genus of plants, having opposite, strongly ribbed leaves, and blue, yellow or red, often showy, flowers. The calyx consists of four or five segments, and the corolla has four or five petals. The fruit is a two-valved, one-celled, many-seeded capsule. Gentians are for the most part natives of hilly or mountainous districts in the northern hemisphere. The root has a yellowish-brown color and a very bitter taste, and it is imported in considerable quantities into the United States, where it is used medicinally and, also, as an ingredient of cattle foods. Several species grow in this country, among them the beautiful blue fringed gentian of the Northern states.

Genus, *je'nus*, in scientific classification, an assemblage of species possessing certain characters in common, by which they are distinguished from all others. It is subordinate to *order*, *tribe* and *family*. A single species, possessing certain peculiar characters which belong to no other species, may also constitute a genus, as the giraffe. In naming plants and animals, the generic name is given first, as *Felis leo*. Here the name *Felis* is the generic name and shows that the lion belongs in the cat genus. *Leo* is the specific name. In writing it, the generic name is often abbreviated as *F. leo*.

Geoffrey, *je'f'ry*, of **Mon'mouth** (about 1100—about 1154), an ecclesiastic and historian of the twelfth century. He sprang from the Norman settlers in Wales and became archdeacon of Monmouth, whence he was, in 1152, raised to the bishopric of St. Asaph. His famous history was first published in 1128. This *Chronicon sive Historia Britonum* is now known to be, as the

compiler states, chiefly a translation from an ancient book in the Breton tongue, discovered by Walter Calenius, an archdeacon of Oxford. It contains a pretended genealogy of the kings of Britain from the time of the fabulous Brutus, or Brute, the Trojan, to the death of Cadwallader, king of Wessex, in 688. It was soon translated into French, English and Welsh and became a great source of romance to the writers of successive generations.

Geographical Societies, associations formed with the view of obtaining and disseminating geographical knowledge. Among such societies in the United States are the American Geographical Society, which publishes a journal called the *Bulletin*; the National Geographical Society, which publishes the *National Geographic Magazine*, and the societies of Baltimore, Philadelphia and Chicago. The Royal Geographical Society in London is one of the most important organizations of this class.

Geography is the science that describes the earth in its present condition, including the distribution of plants and animals on its surface, and treats of it as the home of man. Geography is more or less closely related to all other branches of natural science. In determining the form, measurements and motions of the earth, it depends upon principles and laws discovered by astronomy. In describing the earth's surface and the material of which it is formed, it touches upon geology, and it draws upon botany and zoölogy in its discussion of vegetable and animal life; while in treating of man it depends for many of its facts upon ethnology, and it is also the foundation upon which history largely rests. Nevertheless, geography is not simply a collection of facts obtained from these various branches of science, but it is in itself a science, based upon principles and laws which have been discovered by comparing the results obtained from the sciences with which it is so closely related.

Geography is generally classified in four divisions, mathematical geography, physical geography, political geography and economic geography. *Mathematical geography* is that branch of geography which treats of the form, size and motions of the earth and the measurements upon its surface. It is closely related to astronomy, also to surveying (See ASTRONOMY; SURVEYING; MAP). *Physical geography* treats of the surface of the earth in its present condition and discusses the principles and laws under which these conditions have been produced, points out the natural divisions of land and

water, shows the relation of climate to life and the relation of the earth to man. In the United States the term physiography is now very generally used to denote physical geography (See *PHYSIOGRAPHY*). *Political geography* treats of the earth in its relation to man, discusses the political divisions, their boundaries, the various forms of government, religion and other institutions which man has established. It is very closely related to, and by some geographies is made to include, the fourth division, economic geography. *Economic geography* treats of the industries upon the earth in their relation to the geographical conditions and also to one another. In its broadest sense it includes all of human activity, but in ordinary discussion it is usually restricted to commerce, manufactures, agriculture and mining, and under this restriction it is known as commercial geography.

HISTORY. The ancients' ideas of the earth were very vague. By them it was generally considered flat or in the form of a shield surrounded by water and covered by the canopy of the sky. The Phoenicians were the first to extend geographical knowledge. It is supposed that they explored the coasts of the Mediterranean, and some believe that they made voyages as far south as the southern part of Africa. The Romans' idea of geography was confined to the Roman world, including the southern part of Europe, northern Africa and western Asia, and these boundaries of geographical knowledge were not materially extended until the Middle Ages. In the thirteenth and fourteenth centuries reports from travelers who had been as far as China and Japan gave the people of Europe some knowledge of that part of the world and prepared the way for the great era of exploration which began in the latter part of the fifteenth century. During this period new ideas concerning the form of the earth were advanced, the southern point of Africa was reached and a water route to India was found. The New World was also discovered. These discoveries led to unusual activity during the sixteenth century. The coasts of the New World, with the exception of those bordering upon the Arctic Ocean, were explored, and the earth was circumnavigated. Following this period of discovery, attention seems to have been given to conquest, and during the seventeenth and eighteenth centuries voyages of discovery were not so numerous. The nineteenth century is noted for the many expeditions into the interior of unknown continents and to the polar regions. By the close of that century Africa, Australia

and all other remote lands had been explored, and the only large portions of the earth which had not been visited were those immediately surrounding the poles.

But the greatest advance in geography made during this period was in the organization of its facts in accordance with the principles and laws which governed them and the placing of geography on a true scientific basis. With the accomplishment of this work, views concerning the scope, purpose and value of geography greatly changed. Instead of being considered a knowledge of unrelated facts, it came to be known as a science, depending upon fundamental principles and laws, which were of more importance to the geographer than the mere facts concerning the size, form, inhabitants and other conditions of the earth's surface. The outgrowth of these ideas has led to the establishment of what is known as the *new geography*, which means geography as studied from a scientific point of view. See *CLIMATE*; *EARTH*; *LATITUDE*; *LONGITUDE*; *WEATHER BUREAU*; also *GEOGRAPHY*, in Vol. VI.

Geography, METHODS OF TEACHING. The purposes of geographical study should be:

(1) To give the pupil a knowledge of the most common facts of geography which are found in his immediate surroundings, such as the plants and animals living in his locality and the occupations with which he meets from day to day.

(2) To lead him to become familiar with the fundamental principles and laws of geography, such as those governing climate and the distribution of life.

(3) To lead him to apply these laws and principles in determining geographical conditions.

(4) To lead him to see how these conditions control human activities at the present and how they have affected these activities in the past.

TEACHER'S PREPARATION. In order to accomplish these ends, the teacher must be thoroughly prepared for her work. This preparation should include (a) a knowledge of the fundamental principles and laws of the science and ability to apply them to the conditions of her environment; (b) a knowledge of the great facts of geography, such as the climatic conditions of the different parts of the various continents, the effect of mountains upon climate and the characteristic animal and vegetable life of the different regions of the earth; (c) a knowledge of the more minute facts of her own country, state and town; (d) a knowledge of the princi-

ples of teaching (See METHODS OF TEACHING).

This preparation can be obtained by the study of standard works on geography, the elementary works on the different branches of natural science, particularly physics, botany and zoology; the reading of books of travel and articles of a geographical nature which are found in newspapers and other periodicals. In addition to this the teacher should be a good observer, as by careful observation she will be able to verify in her own experience many of the facts gleaned in her reading.

The teacher should be provided with such material as will assist her in the presentation of the subject in such a manner as to make it both interesting and of practical value to her class. To this end she should make collections of pictures, catalogues and circulars of the great railway and steamship lines of the country. She should also collect and arrange a scrap-cabinet, consisting of articles cut from newspapers and magazines and of references to articles in periodicals and books from which articles cannot be clipped. All this matter should be systematically arranged and catalogued. The most convenient and inexpensive plan is to place the pictures and clippings in large envelopes, either arranged alphabetically or by continent and country. For united study the latter plan is preferable, since according to such a plan all articles pertaining to the United States would be placed in the envelope headed *United States*, or if a special study were made of her own state the articles pertaining to that would be in an envelope by themselves. Pictures can be arranged in a similar manner.

PRIMARY GRADES. The work in geography in the first three grades is preparatory to a systematic study of the subject in the grades which follow. In the first and second grades only the simplest geographical facts should be treated. The beginning of this work is in connection with nature study, the geographical element here consisting of calling attention to the localities in which the plants and animals studied are found (See NATURE STUDY). In connection with this the study of the weather is helpful and interesting. A good plan for this work is to construct a calendar upon the black-board or upon a large sheet of manila paper. The calendar should be ornamented with a picture which expresses the prevailing weather of the month. If it is December and the locality is in a cool climate, this picture should show the

ground covered with snow and, possibly, children engaged in winter sports. If there is room to make the calendar sufficiently large, it adds interest to this work to characterize the weather of each day by an outline picture, in which some leading event of the day will be brought out.

From the study of plants and animals, the class naturally passes to the study of the most common substances used for food, for clothing and, with the older classes, for building purposes.

The work of the second year should be a continuation of that of the first year; but as this work is expanded the geographical feature should be more strongly emphasized, and the pupils should be led to discover many geographical facts for themselves. This should be done largely by out-of-door excursions, by which pupils may come into personal contact with nature and its phenomena. The work in geography for the third year should be largely home geography. The pupils should study the various occupations in the town or near-by city and should be led to see the reason for each of these and something of their relation to one another. This naturally leads to the study of transportation, and the reasons for carrying commodities from one place to another should be discovered. Map making should begin this year and should be of the simplest sort, consisting first of a map of the schoolroom, then of the school building and grounds. This line of work should be carefully planned and supervised by the teacher. The idea of scale should be thoroughly fixed in the minds of the pupils, and they should be led to see what a map is and what it represents. The ideas gained from travel can also be profitably introduced in this grade. Some pupils may have taken journeys to neighboring towns and cities and can relate something of what they saw. Imaginary journeys can also be taken, and suitable books of travel can be read by the pupils themselves or by the teacher, at stated times during the day.

In developing the work of the second and third grades, special attention should be given to teaching the pupil fundamental geographical concepts, with their appropriate terms, such as bodies of water extending into the land (bays and gulfs), small bodies of water surrounded by land (pools and lakes), abrupt elevations of land (hills and mountains). This line of work should be extended to cover the fundamental facts of geography, giving the pupil the necessary vocabulary for expressing himself in proper

terms when he takes up the formal study of the text-book.

In connection with this, pupils should be taught to read maps properly; that is, to place behind the map symbols the proper mental picture, so that an irregular line (river) shall not represent a mere mark upon paper, but flowing water, containing its appropriate aquatic life, bearing on its bosom the country's commerce and giving to the country through which it flows luxuriant verdure and productive soil.

INTERMEDIATE AND GRAMMAR GRADES. Fourth grade classes usually begin the study of geography by the use of the text-book, and perhaps more failures in teaching this subject occur at this point than at any other. The reasons for these failures are that the pupils are not suitably prepared for the text-book and that the teacher does not become sufficiently familiar with the scope and plan of the work to introduce the pupils to it in such a way as to enable them to overcome the difficulties attending its use. The first requisite to the successful teaching of the text of a primary geography is a thorough understanding of the book on the part of the teacher; the second is a discovery of the geographical knowledge which the pupils possess. With these facts in mind the skillful teacher can so adjust the class to the book as to remove the difficulties usually met at this stage of the study.

Map making should be carried on during this year and should be extended to include sketches of the natural divisions studied and, in the latter part of the year, of the countries. Maps drawn by the pupils should be as simple as possible and should never include more than the most important features. In the main, they should be sketched and the work should be rapidly done, but accuracy of form and proportions should be insisted upon.

The work in the grammar grades is simply a continuation of that begun in the fourth grade. The difficulties to be watched and overcome are those which occur in the transition from the primary to the advanced text-book. Many texts in geography used in the grammar grades begin with a discussion of the fundamental principles of mathematical geography. Such a discussion requires altogether too broad a generalization for pupils of this age and leads to confusion and discouragement and often to a thorough distaste for the subject. Books so arranged should not be strictly followed in plan. If this part of the work is to be taken at all, it should be consid-

ered after the other portions of the book have been completed and the pupils have reached a more mature stage.

STUDY OF TYPES. One of the most successful plans of teaching geography is by leading the pupils to study types. There are so many facts in geography that only a few can be studied at best, and when some great topic is taken and understood, it becomes an illustration for all other objects of a similar nature, as a study of the Mississippi River leads the pupils to gain a general idea of all rivers. This is true of the study of all the great forms of land and water and of the leading industries. This method of presentation is successful, provided the teacher thoroughly prepares for the work and confines it to the capacity of the pupils. The danger is that too much will be attempted and that the type study will not be logically connected. With care to avoid these dangers, the study of types is one of the most valuable features connected with geography work. The teacher will find valuable assistance in the following works: McMurry's *Special Method in Geography*; Redway's *New Basis of Geography*, and King's *Methods and Aids in Geography*.

Geological Survey of the United States, a bureau in the department of the interior which has charge of the mineral resources, the geological structure and the irrigation of lands under government control. It was formed in 1879 by the combination of four independent surveys, which for a number of years had been engaged in explorations of the western part of the United States. The bureau is in charge of a director, who is required to submit an annual report of the work done by the survey to the secretary of the interior. These reports are works of great value. The most important duties with which the survey is charged are the preparation of a topographical map of the United States, the examination of mineral deposits, the collection of mineral statistics, the study of the water supply of the country, with reference to the development of water power and irrigation of arid lands, and the classification of public lands. The topographical map when completed will show the distribution of the rock formations of the country, their structure and the location of mineral deposits. As fast as completed, this map is issued in sections in folio form. For the purpose of carrying on its different lines of work, the survey is divided into several sections, among which are those of mining and mineral

resources, metalliferous ores, non-metalliferous products and physical and chemical research. In addition to its annual reports, the bureau publishes numerous pamphlets, monograms and maps.

Geology, *je ol' o jy*, the science which treats of the history of the earth, as learned by the study of its exterior or crust. There are a number of theories concerning the origin and formation of the earth. The one most widely known considers our planet to have been formed by the cooling and condensation of a large mass of gaseous matter, which was thrown off from the sun (See NEBULAR HYPOTHESIS). All theories consider that the earth was in the early stages of its formation at a much higher temperature than it is at the present time. Until very recently, geologists supposed the interior of the earth to be in a molten condition, and this idea gave rise to the term *crust*, which in geology is applied to the earth's exterior. The idea now held by most geologists, however, is, that while the interior of the earth is very hot, it is not necessarily in a fluid condition, because the great pressure upon the interior would so raise the melting point of the rock as to prevent its becoming liquid. The evidences of heated interior are seen in volcanoes and hot springs and in the increase of temperature as excavations are made downward from the surface. The farther the excavations extend, the warmer the crust becomes, until at great depths the temperature is so high that it is almost impossible for men to work unless the mine is cooled by air.

FORMATION OF ROCKS. Whatever theory one may hold concerning the origin of the earth, there is every evidence that the rocks upon its surface have been formed in two ways—by the action of heat and by the action of water. Those formed by heat are known as *igneous rocks*, and they constitute the oldest and by far the largest part of the earth's crust. These rocks first existed in a molten condition and were solidified by cooling. Granite, gneiss and basalt are good illustrations of rocks of this class (See IGNEOUS ROCKS). As the earth's crust cooled, it contracted, and the contraction produced folds, causing some portions of the surface to rise and others to sink. This was the origin of the hills and of mountains and valleys. During the formation of the earth, this process of heating and cooling, rising and falling, was repeated many times, so that the continents as they now exist went through many changes. A good illustration of this is found in the North American

continent. The first land to appear above the ocean was a V-shaped outline extending upon each side of Hudson Bay, the eastern arm of the V forming what is now known as the Laurentian Mountains, while the western arm extended in a northwest direction and constituted a height of land which divided the waters within the V from those to the west of it.

Because of these repeated contractions, the earth's crust was more or less disturbed, and while the first igneous rocks may have been formed in horizontal layers, the repeated foldings caused them to be tilted upon edge and to be thrown up so that now in mountainous regions some of the oldest rocks are found near the summits of the high mountains and many of them *outcrop*, that is, come to the surface beyond the formations of a much later date. Because at first the crust was thin, these upheavals were less abrupt than those of later date; hence, the later mountains, such as the Rocky Mountains in North America, are very high, with irregular and often jagged summits, which were caused by the breaking of the strata at the time of the upheaval.

The rocks formed by water, generally known as *stratified rocks*, are found in the lowlands along the shores of bodies of water and on the margins of streams. The lowlands near the mouths of great rivers were also formed in this way. The rain falling upon the sides of the mountains washed loose particles of rock down to the lower levels, and they were carried along by streams, until the force of the current became so slight that the water would no longer hold them in suspension. These particles then settled at the bottom of the stream, forming mud. In the course of time the land was raised, and this mud hardened into rock. In many places the flooding of the earth's crust caused the stratified rocks to be folded and tilted, so that they do not now occupy a horizontal position as they did when formed. For this reason, also, we find the igneous and stratified rocks intermingled in a confusing manner in many localities. The heat and pressure to which some of these formations were subjected have entirely changed their nature. See METAMORPHISM.

GEOLOGIC SYSTEMS. The history of the rocks is determined almost entirely by studying the fossils which they contain, since these show the life that existed at the time of their formation. The igneous rocks first formed contain no evidences of life, and from this it is inferred that during the earliest periods the conditions of the

earth were such that life could not exist. The oldest rocks contain the simplest fossils, and traces of plant life are found before those of animal life. Beginning, then, with the simplest fossils found in the oldest strata, the geologist traces the development of both vegetable and animal life from the remotest period of their existence to the present time, each period in the earth's history being characterized by the unusual development of some form of life (See FOSSIL). Because of this and of the peculiar grouping of the rocks at the time, geological history is divided into a number of periods, each of which includes several formations, known as rock systems. The periods and systems here given are those generally accepted by the leading geologists of the United States, while the geologists of England and other European countries make some minor changes in their arrangement of the systems. Each of these periods and systems is described under its proper title.

PERIODS	SYSTEMS
Cenozoic	{ Quaternary Tertiary
Mesozoic	{ Cretaceous Jurassic Triassic
Paleozoic	{ Carboniferous Devonian Silurian Ordovician Cambrian
Protozoic	Algonkian
Azoic	Archæan

PRESENT CHANGES. The geological forces which have been in operation during all the ages are still at work, and changes in the earth's crust constantly occur. The most important of the forces now effecting these changes are the heat from the sun, the action of water (See EROSION), the action of the atmosphere and the disintegration of rocks by animal and vegetable life. The action of these forces tends to wear away the mountains and hills and to fill up the valleys. Lakes are becoming more shallow, and many have been changed to dry land within the memory of men now living. The land around the lower courses of rivers is continually rising, as in the case of the Mississippi, and the elevation of the continents is slowly but surely changing, as is shown by the gradual sinking of the eastern coast of North America and of the southern coast of Europe.

See PHYSICAL GEOGRAPHY; DIKE; DIP; FOSSIL; FAULT; JOINT, and the article under this heading (GEOLOGY) in the EDUCATOR, Vol. VI. Consult Heilprin's *The Earth and Its Story*,

Shaler's *Outline of the Earth's History and Aspects of the Earth*.

Geometrical Progression. See PROGRESSION.

Geom'etry, that branch of mathematics which treats of the properties and relations of surfaces, volumes, angles and lines. A *solid* (more correctly termed a *volume*) is a portion of space bounded on all sides and having three dimensions, length, breadth and thickness. A *surface* has only breadth and length. It may be considered as the boundary between a solid and all surrounding space or between two unbounded portions of space. A *line* may be considered either as the boundary between two portions of a surface or as an element having indefinite extension in one direction, that is, having but one dimension, length. A *point* is described as that element which has but position, lacking length, breadth and thickness. An *angle* is a portion of space lying between two lines which meet at a point, or between two or more plane surfaces meeting at a common point or line. Geometry is divided into two great classes, *elementary geometry*, which includes *plane geometry* and *solid geometry*, that is, the study of the properties of planes, lines, angles and of the simple solids; and *higher geometry*, including *analytical geometry* (See ANALYTICAL GEOMETRY), *descriptive geometry* and *projective geometry*. Descriptive and projective geometry deal with the various relations of forms of geometric bodies, according to a special method, by which figures corresponding to certain points in the body are represented on two perpendicular planes, the relations of the various points composing the body being studied by comparing these two figures.

METHODS. The methods of geometry differ in important respects from those used in any other branch of mathematics. Geometry reasons about absolutely abstract relations and constructs theories and systems which can have no possible concrete existence. For instance, whereas in physics two quantities can be compared only by being placed opposite to each other or by being weighed or measured by some common unit, in geometry two solid bodies are often discovered to be equal by supposing one to be superimposed upon another, that is, to be made to coincide in all its parts.

Two methods of reasoning in geometry may be distinguished, known, respectively, as *direct* and *indirect*. The former starts from certain self-evident or incontrovertible facts and proceeds step by step to a conclusion, which, provided

every step is in accord with pure reason, must be equally self-evident or incontrovertible. The indirect method begins with a supposition which may or may not be true, but which, for the sake of investigation, is assumed to be true. Upon this as a basis, a system using only known truths and demonstrated propositions is built up to a conclusion. If this conclusion accords with some known principle, the original supposition is shown to be sound. If the conclusion evidently disagrees with some known principle, the original supposition is clearly shown to be false. In the latter case the demonstration is said to be *reductio ad absurdum* (a reduction to an absurdity).

AXIOMS. All geometrical reasoning, whether direct or indirect, depends upon certain fundamental propositions, or axioms, among which may be mentioned the following, established by Euclid as a basis for his *Elements*: (1) Right angles are equal; (2) geometric figures can be moved in space without change of shape or size; (3) magnitudes which coincide with each other are equal; (4) the whole is greater than any of its parts; (5) two straight lines cannot enclose a space. Besides these he assumed a series of so-called postulates, or self-evident theorems, among which are (1) a straight line can be drawn between any two points; (2) a straight line can be produced to any length; (3) a circle may be described from any center to any distance from that center. These propositions and a few others which have been added from time to time by modern mathematicians are still the foundation of reasoning in geometry.

HISTORY. The science of geometry probably began with the Egyptians, but received its first important impetus from Greek mathematicians, among whom were Thales and Pythagoras, who studied triangles and circles, and Plato, who introduced the analytic method of investigation. Then came Euclid, known as the "father of geometry," who not only organized all the facts evolved by his predecessors, but added many new theorems. Of his followers, Archimedes and Apollonius were especially important. After the seventh century A. D. a period of stagnation in mathematical science set in, which was not ended until the sixteenth century, when the work of Vieta, Pascal and Desargues led to the application of more general methods of study and demonstration in geometry and especially to the introduction of algebraic formulas. Then followed Descartes, who extended the application of algebraic methods and laid the foundations

of modern calculus. Little further progress was made until the nineteenth century, when branches known as descriptive geometry and projective geometry were differentiated from the original subject.

George I (GEORGE LOUIS) (1660-1727), king of Great Britain and Ireland and elector of Hanover, was, through his mother, the great-grandson of James I of England. In 1682 he was married to Sophia Dorothea of Zell, whom, in 1694, he divorced. In 1698 he succeeded his father as elector. He commanded in the imperial army during the War of the Spanish Succession and won considerable distinction for his bravery. In 1701 he was declared heir to the British crown, and he ascended the throne on the death of Queen Anne in 1714. Among the notable events of his reign were the rising of the Scottish Jacobites (1715); the triple and quadruple alliances against Spain, and the failure of the South Sea Company (1720). George I was very unpopular with his British subjects, by reason of his lack of sympathy with England's traditions and ideals.

George II (GEORGE AUGUSTUS) (1683-1760), king of Great Britain and Ireland and elector of Hanover, the son of George I. He married in 1705 Wilhelmina Carolina of Anspach, who always had a good influence over him. In 1708, while electoral prince of Hanover, he distinguished himself at Oudenarde, under Marlborough. In 1727 he succeeded his father on the English throne, but inherited to the full his father's predilection for Hanover and dislike of England. The Seven Years' War, during which occurred the conquest of Canada, and the exploits of Clive in India, which furthered the growth of the British Empire there, are among the chief events of his reign.

George III (1738-1820), king of Great Britain and Ireland, succeeded his grandfather, George II, in 1760. In the following year he married Princess Charlotte Sophia of Mecklenburg-Strelitz. The young prince had been given an English education, and this made him from the outset of his reign more popular than his predecessors had been. The sixty years of his reign were filled with great events, among which were the Wilkes controversy; the American Revolution; the French Revolution; the Napoleonic wars, which followed, and the Irish Rebellion of 1798. In 1810 the king's mind, which had already given way several times, finally broke down, and from that time to his death his son governed as his regent.



GEORGE V

George IV (GEORGE AUGUSTUS FREDERICK) (1762-1830), king of Great Britain and Ireland, son of George III and the princess Charlotte of Mecklenburg-Strelitz. In 1811 George became regent on account of his father's insanity, and, on the death of George III in 1820, he became king. The most important event after his attaining the throne was the passing of the Catholic Emancipation act, by the Wellington ministry in 1829. He left no descendants and was succeeded by his brother, William IV.

George V (GEORGE FREDERICK ERNEST ALBERT) (1865-), king of the United Kingdom of Great Britain and Ireland and emperor of India, second son of Edward VII, was born June 3, 1865. At the age of 12 he entered the navy as a cadet, where he was subjected to the same discipline and training as his shipmates. He rose in the naval service until he reached the rank of commander, but on the death of his elder brother, the Duke of Clarence, in 1892, he retired from active service, although he retained his commission and was subsequently promoted to captain, rear-admiral, and vice-admiral. In 1893 he married Princess May of Teck, through her mother a great-granddaughter of King George III. In 1901 the prince and princess made a tour of the world, visiting the chief British colonies. When his father became king, he made the Prince of Wales his assistant in public affairs, so that he became familiar with the duties of the sovereign. On the death of Edward VII, May 6, 1910, George became king. The coronation took place on June 22, 1911. King George, unlike his father, is of a quiet, reserved nature, and little inclined to participate in social life. He is an expert in agricultural matters, and his herds of cattle are world-famous. He is also an enthusiastic collector of postage stamps, his collection being one of the most valuable in existence. He is a first cousin of Emperor William II and Czar Nicholas II.

George I (1845-1913), king of Greece, second son of Christian IX of Denmark. In 1863 he was elected king by the Greek National Assembly. In 1867 he married the Princess Olga, a niece of the Russian Czar. His conduct as a constitutional monarch was always wise and firm, and he won popular sympathy by his efforts to expand Greek territory.

George, HENRY (1839-1896), an American political economist, born in Philadelphia. He went to California when a boy, found employment as a printer and became eventually an editor. In 1879 he published *Progress and Poverty*,

in which he promulgated the "single tax" theory (See SINGLE TAX). His works include various treatises upon the land question, the *Science of Political Economy* and *Protection or Free Trade*.

George, ORDER OF SAINT. The following are the principal orders which have been founded in honor of Saint George: 1, A military order instituted in Russia in 1769 by Empress Catharine II, as a reward of military achievements; no officer lower than the rank of colonel can become a member. The decoration is a white Maltese cross, edged with gold, bearing an image of Saint George and the dragon and suspended from an orange and black ribbon. 2, An order instituted in Bavaria by Emperor Charles VII (Charles Albert) in 1729 and reorganized by King Louis II in 1871, with the king as grand master. Eight generations of nobility on both sides must be shown by the candidate for admission. An eight-pointed cross, showing on one side the image of the Virgin with the letters V. I. B. I. (*Virgini Immaculatae Bavaria Immaculata*) forms the decoration. The other side has an image of Saint George, with the letters I. V. P. F. (*Justus ut Palma Florebit*). 3, An order instituted by Ernest Augustus of Hanover in 1839 and dissolved in 1866. 4, A Sicilian military order, instituted by Joseph Napoleon in 1808, remodeled by King Ferdinand IV in 1819 and dissolved in 1861. 5, The name under which the Order of the Garter was first instituted in England.

George, SAINT (?-303), the patron saint of England. His origin is very obscure, but it is claimed that he was educated in Cappadocia and suffered martyrdom there. He was adopted by the Genoese as their patron saint, and in 1222 the Council of Oxford ordered that his day (April 23) should be observed as a national holiday in England; in 1350 he was made the patron of the Order of the Garter by Edward III. The red cross of Saint George on a white ground is seen on the Union Jack and was formerly worn by the English soldiery. A legend which is doubtless an invention of the Middle Ages states that Saint George slew an immense dragon which was threatening to devour a beautiful princess.

George Eliot. See ELIOT, GEORGE.

George Junior Republic, a small organized community of boys and girls, near Freeville, N. Y., founded in 1895 by William R. George of New York. Its purpose is to give to neglected and unfortunate children the training which will equip them for performing the duties of

citizenship and for earning an honest living. The community is a republic in form, governed by a constitution similar to that of the United States. Its officers are elective, and no office is now filled by an adult, the only limitation upon the powers of the youthful citizens being a veto power retained by the trustees. Children from twelve to eighteen years are admitted to the republic, and all members under sixteen must attend its schools. Training is given in profitable occupations, as farming, carpentry, printing, domestic science; and the equipment includes schools, hotels, stores, a bank, a library and numerous workshops.

Georgetown, the capital of British Guiana, near the mouth of the Demerara River. It is neatly built, consisting of broad streets at right angles, with canals in the middle, and lofty wooden houses, often with luxuriant gardens attached. The harbor is suitable for sheltering a considerable commerce, in which the chief exports are sugar, rum and coffee. The climate is exceedingly unhealthful, owing to the surrounding swamps. Population, 53,176.

George Washington University, **THE**. The George Washington University of the city of Washington, D. C., was originally chartered in 1821 as The Columbian College in the District of Columbia. It was, by act of Congress, changed to the Columbian University in 1873, and under act of Congress, Jan. 23, 1904, it became The George Washington University. Under this act the university was made non-sectarian and given power to organize colleges for carrying on educational work in arts, sciences and liberal and technical knowledge. The university comprises the Faculty of Graduate Studies, the Columbian College, the Washington College of Engineering, the Division of Architecture, the Faculty of Medicine, the Faculty of Dentistry, the Department of Law and Jurisprudence, the Department of Politics and Diplomacy and the National College of Pharmacy. In 1912 there were enrolled 1270 students. The faculties and teaching staff comprised 200 professors, assistant professors, instructors and lecturers. The university buildings are situated within the heart of the city, being but one block removed from the treasury department. As this location is now being sought for business purposes, property has been acquired within a short distance from the White House and beside the Park. The central location within the city enables the students of the university to make use of the unusually abun-

dant supply of material collected by the United States government in its museums, libraries, laboratories and archives, which, by act of Congress, April 12, 1892, is accessible to scientific investigators and to the students of any institution of higher education now incorporated or hereafter to be incorporated under the laws of Congress or of the District of Columbia. According to the librarian of Congress, there are thus, in the city of Washington, "34 governmental libraries freely available for research. These libraries now contain in the aggregate over 2,000,000 books and pamphlets and over 500,000 other articles literary in character—manuscripts, maps, music and prints." The George Washington University offers an academic home to the advanced students of other universities of the United States, during their stay in Washington, to pursue their researches in the preparation of theses to be offered for degrees in the institutions from which they may come.

Georgia, *jor'je ah* (popularly called the **EMPIRE STATE OF THE SOUTH**), a South Atlantic state, the largest of the original thirteen, is bounded on the n. by Tennessee and North Carolina, on the e. by South Carolina and the Atlantic, on the s. by Florida and on the w. by Alabama. The length from north to south is 320 miles; its breadth, 259 miles; its gross area, 59,265 square miles, of which 540 are water surface. In 1900 the population was 2,216,329; in 1910 it was 2,609,121.

SURFACE AND DRAINAGE. A triangular section in the northern part of the state having an area of about 6000 square miles is crossed by the Blue Ridge, the Cohutta, Taylor's Ridge and other ranges of mountains, which extend in a northeast-southwest direction. All of this section has an altitude of 1000 or more feet, but there are no very high peaks among the mountains, the highest not reaching 6000 feet. Lookout Mountain, famous for its scenery and for famous battles of the Civil War, is partly in Georgia and partly in Tennessee. This entire region is interspersed with hills and valleys and is noted for the beauty of its scenery. In the extreme northwestern part of the state is located Chickamauga National Park, which is surrounded by hills and low mountains. To the southwest of the mountain region are the foothills, which extend for about 65 miles and form a section of country diversified by low hills and broad valleys. This is a portion of the Piedmont region, which extends southward through

the Carolinas (See **PIEDMONT REGION**). To the south and east of the Piedmont region is the coastal plain, which occupies fully one-third of the state. The surface of this region is low and level, and in the southeastern corner of the state, extending into Florida, is the great Okefenokee Swamp. Off the coast are a number of large islands, with low surface and fertile soil. Along the Fall Line, where the Piedmont region descends to the coastal plain, are rapids or falls in most of the streams, and the location of such towns as Augusta, Milledgeville, Macon and Columbus is accounted for largely by this fact, since the fall of the river furnishes excellent water power.

Georgia's drainage system comprises the whole or part of nine river basins, and the state contains an unusual number of large rivers. The extreme northwestern part is drained into the Tennessee. To the east and south of this system is the basin drained by the Coosa, formed by the junction of the Ostanaula and Etowah rivers. Lying southeast of these rivers is the valley of the Chattahoochee, through which the river flows diagonally across the state in a southwesterly direction until it reaches the western border, when it turns southward and forms the southern half of the western boundary. As it enters Florida it is joined by the Flint, the united streams being known as the Appalachicola. The Flint River flows southward through the western part of the state and is approximately parallel to the Chattahoochee through the greater portion of its course. The Ocmulgee and Oconee rise south of the Chattahoochee and flow southeasterly, uniting to form the Altamaha, which conducts their water to the Atlantic. The Altamaha is navigable to the junction of the rivers by which it is formed, a distance of 300 miles. South of the Altamaha is the Saint Mary's, forming a part of the boundary between Georgia and Florida. The Satilla is its chief tributary. The Savannah, with its extension, the Tugalo, forms the boundary between Georgia and South Carolina, and is navigable to Augusta, 300 miles. Many of these rivers furnish water power for manufacturing.

CLIMATE. The northern half of the state is characterized by a mild and salubrious climate. The winters are not cold nor the summers hot, and this region is enjoyed by people from the North who wish to escape severe winters. In the coastal plain the summers are exceedingly hot and enervating, and along the coast, especially where the land is marshy, malaria and fevers are likely to attack those who are not

accustomed to residing in such localities. The middle portion of the state has an equable climate, somewhat warmer than that in the northwestern part. The rainfall varies, being heaviest in the north, but its average is about 49 inches for the entire state.

MINERAL RESOURCES. The mountainous region is rich in minerals, the most important of which are coal, iron, bauxite (the ore of aluminum), manganese, marble and granite, and throughout the state brick clay and pottery clay are abundant. The coal is of a semi-bituminous variety and is valuable for nearly all purposes. The quarrying of marble has become an important industry. The Georgia marble is of excellent quality and strength and has acquired a wide reputation as a building and finishing stone. Iron ore and manganese are also quite extensively mined. Among other minerals found in smaller quantities are gold, silver and a few precious stones, including the amethyst and beryl; but the mining of these is a comparatively small industry.

AGRICULTURE. Agriculture is the leading occupation, and nearly seven-tenths of the surface of the state is in farms. Cotton and corn are the most important crops, the islands along the coast being especially adapted to the growth of sea-island cotton, and the west central and southwestern portions being suited to the upland variety. The annual crop is about 4,500,000 bales, giving Georgia rank next to Texas in the production of this important crop. In the southern part of the state melons, peanuts, garden vegetables, oranges, pineapples, lemons and other semi-tropical fruits are raised in large quantities. The uplands in the interior furnish an abundance of pasturage, and sheep, cattle and hogs are raised in large numbers. As in other Southern states, many of the farms are rented to negroes, by whom most of the work is performed with simple tools and implements. Extensive areas are covered with forests. In the north, these include the hard woods, such as oak, hickory and maple, while in the south the long-leaved pine is the prevailing timber tree.

MANUFACTURES. Since 1890 Georgia has made rapid strides as a manufacturing state, and in this regard she leads the Southern states. The most important manufacturing industry is that of cotton goods. A large number of mills are now in operation, and they have attained remarkable success. The production of hosiery and other knitted goods is also becoming important. There are also a number of mills for the

manufacture of woolen fabrics. In the north-west are numerous iron works, and the manufacture of cotton gins and other machinery gives employment to a large number of people. The increased production in corn and wheat is also increasing the grist mill products from year to year. The production of lumber, turpentine and rosin is also very important, since Georgia is one of the leading lumber states of the South. Most of this product is sent to other states. While Georgia is excelled by some other Southern states in the production of cotton, she leads all in the variety and output of her manufactured products as a whole.

TRANSPORTATION. The large number of navigable rivers affords the state easy and cheap water transportation, but these are not as much used as formerly, because of the large number of trunk lines of railway now traversing the state in all directions. The important railway centers are Atlanta, Savannah, Augusta, Macon, Columbus, Athens and Waycross. By means of the numerous lines, which have a mileage of nearly 6000 miles, all important towns have railway communication, and every county is crossed by one or more lines, while the trunk lines form direct communication with northern states.

COMMERCE. The commerce of the state is important. The large output of cotton and marble, as well as the production of cotton goods and other manufactures, together with her lumber and forest products, gives Georgia an extensive export trade. The imports of the state consist of those manufactured goods and food products not raised with profit.

GOVERNMENT. The legislative department consists of a senate and a house of representatives, the members of each being chosen for two years. The senators are apportioned among districts, and the representatives among the counties, on the basis of population. The legislature holds annual sessions, which are limited to fifty days. The governor, comptroller-general, secretary of state and treasurer are elected by the people, the governor holding office for two years and being ineligible for four years after he has served two consecutive terms. The judicial power is vested in a supreme court consisting of a chief justice and five associates, chosen for six years by popular vote, and superior courts, which are held in each judicial district. The judges for these courts are also elected by the people for a term of four years.

EDUCATION. The public school system is under the general direction of a state school commissioner and state board of education. There is a school fund of nearly \$2,000,000, which is supplemented by state and local taxation and also, to a small extent, by the Peabody Educational Fund for the purpose of conducting teachers' institutes and giving other instruction for the training of teachers (See **PEABODY EDUCATIONAL FUND**). In all of the larger cities and towns, graded schools for both colored and white pupils are established, and high schools are liberally supported in all the larger centers. General interest is taken in education, and the schools throughout the state are being brought to a higher degree of excellence from year to year. The University of Georgia, established at Athens, has a semi-official relation to the public schools and other higher institutions in the state. Among these are several branches of the university, namely, the technological school at Atlanta, the North Georgia Agricultural College at Dahlonega, the state normal school at Athens, the state industrial college for colored youth at College, and the Georgia Normal and Industrial College at Milledgeville. There are also numerous secondary schools and colleges throughout the state for both white and colored students, supported by the various religious denominations of the country.

CITIES. The most important cities are Atlanta, the capital and largest city; Savannah, the chief seaport; Augusta; Macon; Columbus; Athens, and Brunswick, each of which is described under its title.

HISTORY. The territory of Georgia was explored in 1540 by De Soto and in 1562 by Ribaut. It was a part of the original Carolina grant, but when the two Carolinas were made royal provinces the territory between Saint Johns and Savannah rivers was reserved as Crown land. In 1732 a company was organized by James Oglethorpe to found a colony in America as a refuge for poor debtors and religious fugitives of Great Britain and Germany. Savannah was established in the following year. The colony was liberally governed and prospered during its early history. An interesting event of Georgia's early history was the war with the Spaniards in 1740, in which, though unsuccessful, the English colonists proved to be brave and skilful fighters. Oglethorpe returned to England in 1743, and after his departure the colony rapidly declined under the unfortunate rule of his successors. At this time was introduced the

trade in slaves and rum. The charter was surrendered in 1752, and Georgia was organized as a royal province. By the proclamation of 1763 the territory of Georgia was increased to include a strip of land extending to the Mississippi. Georgia bore her part in the Revolutionary War, following the lead of other states, and she suffered severely at the hands of the British and Tories. She ratified the Articles of Confederation in 1778 and was among the first to ratify the Federal Constitution (January, 1780). After the war the state was occupied with indian disturbances, which eventually brought it into collision with the United States government, regarding the control of indian lands. This was finally settled when the last of the Cherokees removed from the territory in 1838. In spite of the strong hold of slavery upon the commercial interests of Georgia, there was a decided Union sentiment in opposition to secession, led by Alexander H. Stephens, but the state seceded in January, 1861. It was the scene of important military operations during the Civil War, including the marches of General Sherman, and at the close of the struggle it suffered serious commercial depression. A bitter contest was waged in Georgia during reconstruction times, and twice the refusal of the legislature to conform to the requirements of Congress caused the state to be placed under military rule. She finally was admitted in 1871. During this time the carpet-bag government was in full force and the wealth of the state was wasted in wretched speculations and frauds. In recent years prosperity has returned, and the natural resources of the country are being rapidly developed. The state has been almost uniformly Democratic in state and national politics since 1872.

Georgia, a region in Transcaucasia, forming the main part of the Russian governments of Tiflis and Kutais and comprising the ancient kingdoms of Colchis, Iberia and Albania. Tradition traces the ancestry of the Georgians back to Japhet, but their history first becomes trustworthy at the time of Alexander the Great, when they were freed from foreign rule and united into one kingdom under Pharnabazus, 324 B. C. Toward the end of the fourth century they became Christianized. For a time they were under the Arab caliphs, but toward the end of the eleventh century they regained their independence. From 1184 to 1212 they were in the height of their prosperity under Queen Tamara, who married a Russian prince. In

1799 George XIII resigned his throne in favor of the Russian emperor Paul, and in 1802 Emperor Alexander proclaimed the territory a Russian province. The beauty of the Georgian men and women has long been famous.

Georgia, STRAIT OF, a large strait of the North Pacific Ocean, between the continent of North America and Vancouver's Island, about 250 miles long and 30 miles wide. It communicates with the ocean on the north by Queen Charlotte's Sound, and on the south by the Straits of Juan de Fuca.

Georgia, UNIVERSITY OF, a state institution of collegiate degree, which is at the head of the state system of public instruction in Georgia. It was chartered in 1785 and is the oldest state university in the country. According to the provisions of the charter, the primary and secondary schools of the state are officially connected with the university. The university proper is located at Athens and includes the Franklin College of Liberal Arts, the State College of Agriculture and Mechanic Arts, the law school and the graduate school. In addition to this, there are a number of other colleges, located in different parts of the state, which are affiliated with the university. The enrollment is about 1900 students of college grade, and the faculty contains over 160 members. Tuition is free to all residents of the state, except in the professional schools.

Georgian, *jo'ra'n*, Bay, a bay in Canada, formerly called Lake Manitoulin. It constitutes the northeast part of Lake Huron and is partly separated from the main body of the lake by the peninsula of Cabot's Head and the island of Great Manitoulin. It is about 120 miles long and 50 miles broad and contains a large number of islands.

Gera'nium, *je ra'ni um*, a family of plants of which there are many species. One genus, the popular name of which is *crane's-bill*, is found wild in parts of Europe and the United States. It is commonly cultivated because of the medicinal properties of the roots. A second genus, of which the common species is *alfalaria*, is common in the Pacific coast region, where it is valuable as a forage plant. Another genus comprises the common ornamental geraniums, so widely grown in gardens and houses. These plants are natives of the Cape of Good Hope and are popular because of their fragrant and brilliant flowers and their beautifully marked foliage. The commonest species are the *rose geranium* and the *scarlet geranium*.

Gerard, *zha rah'r*, FRANCOIS PASCAL, Baron (1770-1837), a French historical and portrait painter, born at Rome. In 1786 he went to Paris and studied under David, whose style he followed. Some of his best works are *Blind Belisarius*, *Psyche Kissed by Cupid*, *Three Ages* and *Homer*. Among his portraits the most famous are those of Talleyrand, Talma, Louis Philippe, Madame Récamier and Mlle. Mars.

Gerard, JEAN IGNACE ISIDORE. See GRANDVILLE.

German, *jur'man*, **East Africa**, the most important and the largest of German colonies. It lies in Africa on the east coast, and is bounded on the e. by the Indian Ocean; on the s. by Portuguese East Africa and Lake Nyassa; on the s. w. by British Central Africa; on the w. by Lake Tanganyika and Kongo Free State, and on the n. by British East Africa. Its northern boundary crosses Lake Victoria Nyanza. The area is estimated at 384,180 square miles. The island of Mafia, off the coast, belongs to the colony. The coast of German East Africa is low and flat, but there are high plateaus in the interior, from which rise lofty mountain groups, among them Kilimanjaro, a volcanic peak 19,720 feet high and the highest point in Africa. The country is watered by the rivers Rfu, Pengani, Mgeta and Rufigi and their tributaries, none of which are navigable. There are some unimportant streams in the interior, which drain into lakes Tanganyika and Victoria Nyanza and thence into the Kongo and the Nile. The chief industries are agriculture and cattle-raising. Millet, wheat, cotton, sesame, tobacco, copra and rice are grown, and bananas are cultivated along the coast. The chief exports are ivory, rubber, cereals and coffee. Coal, iron, salt and a little gold have been found.

The administration is in the hands of a governor, appointed by the emperor, and the colony is divided into eight districts and fourteen stations. The seat of government is at Dares-Salaam, which is one of the chief seaports. This colony began in 1884, when an expedition sent by the German Colonization Society secured territorial rights by treaties with native chiefs. A short time later, Germany declared a protectorate over the land, and in 1885 the rights secured passed to the German East Africa Company, which proceeded to extend the territory. Its commerce is now under the management of the German East Africa Company, which depends upon imperial grants for support. Population, estimated at 6,000,000.

German Empire, *THE*. See GERMANY.

Germanicus Caesar, *se'zahr* (15 B. C.-19 A. D.), a distinguished Roman general, son of Nero Claudius Drusus and Antonia, a niece of Augustus. When Augustus died in 14 A. D., Germanicus was invited by the rebellious legions on the Rhine to assume the sovereignty, but refused and quelled the revolt. Two years later he made his way into Germany, defeated the Cherusci under Arminius and made an incursion into the country of the Marsi. Tiberius grew jealous of his popularity, recalled him and sent him to Syria, where he died, probably poisoned by Piso, the governor of Syria.

German Language. The history of the German language is divided into three parts—Old High German, to 1100; Middle High German, from 1100 to about 1500; New High German, from about 1500 to the present time. The limits are approximately the same as those assigned to the three periods of the English language. The word "High" in each case has a purely geographical significance. In the earlier periods of the language, the dialects of South Germany are designated as High German, from the more mountainous character of those districts, while the language of North Germany was called Low German. The Low German dialects, as well as the High, were spoken in the periods referred to, but as the works of literature preserved belong chiefly to the latter dialects, the whole period is so characterized. By examination of dialectal peculiarities, scholars are able to locate specimens of literature from those periods with considerable exactness. In the same way to-day a German peasant's native province can be approximately determined. These peculiarities, which the printing press and a uniform educational system have obliterated in a great measure in the spoken language, especially in the last generation, still survive in the more isolated districts, and it is quite possible to find two peasants from different parts of Germany who cannot make themselves understood by each other. In modern printed German there are no considerable variations, but in speech even the educated will usually betray their dialect in some peculiarity of pronunciation or vocabulary.

The most powerful agency in fixing a common written language for Germany was Luther's translation of the Bible (1522), and this is conveniently made the beginning of the New High German period. The fact that this work had a wide circulation made its dialect, which was intermediate in character and geographical position,

familiar throughout Germany, and subsequent writers who wished to reach a large circle of readers naturally employed it. The first German grammar appeared in 1540, and subsequent grammars and dictionaries gradually fixed the forms of the language. The progress toward a uniform standard was slow, and the perfection of the language was not attained until the eighteenth century. The progress, as in the history of every language, was toward simplification of inflection and complication of syntax.

German Literature. See LITERATURE, subhead *German Literature*.

German Silver or **Nickel Silver** is an alloy of copper, nickel and zinc in different proportions, among which the following may be mentioned: Spoons and forks are made from two parts copper, one nickel, one zinc; knife and fork handles from five copper, two nickel, two zinc, a mixture closely resembling alloyed silver; addition of lead produces an alloy which appears well fitted for casts and for making candlesticks. Iron or steel, on the other hand, makes the alloy whiter, harder and more brittle. German silver is harder than silver and takes a high polish. It melts at a red heat, the zinc being volatilized in the open air. It is attacked by the strong acids; it is also affected by common organic acids, such as vinegar, and by some saline solutions.

German Southwest Africa, a German territorial possession on the western coast of Africa, extending for a distance of 900 miles, from the Orange River to the Cunene River, excepting Walfish Bay, which is a British possession. The area is estimated at 322,450 square miles. The north part of German Southwest Africa is called Damaraland, and the southern, Great Namaqualand. The region is mostly a plateau, with mountains rising in the Onataka to a height of 8800 feet. The chief industry is cattle-raising. In the western part are fine pastures and much fertile land. Little has yet been done to develop the discoveries of gold, copper and lead. The exports are ostrich feathers, hides, horns, ivory and wool. The harbors are for the most part poor, and most of the trade of the country is done through the British port at Walfish Bay. The capital is Windhoek. Population, 200,000. See RACES OF MEN, *color plate*, *Negro Types*, Fig. 11.

Ger'mantown, **BATTLE OF**, an important battle of the Revolutionary War, fought October 4, 1777. A British force under General Howe was in possession of Germantown, a suburb of Philadelphia. The Americans under Washington attacked this position in two columns and

were at first successful, but a fog arose and two American forces approached one point from opposite directions and fired into each other's columns, immediately creating a panic among the Americans and causing defeat when victory was practically assured. The daring and skill of Washington's plan deeply impressed European military critics and was one of the causes which led to the French alliance.

Germantown was formerly a separate suburb of the city of Philadelphia, about 5 mi. n. of the center of the business district, but it is now included within the city limits. It is noted for the beauty of its surroundings and for its elegant homes, buildings and parks. It was settled in 1683 by Palatinate Germans; the first paper mill in America was established there in 1690, and the first American edition of the Bible was published there in 1743.

German Universities. See UNIVERSITY, subhead *German Universities*.

Germany or **The German Empire**, a country of Central Europe, lying between 47° 16' and 55° 54' north latitude and between 5° 52' and 22° 53' east longitude. It is bounded on the n. by the North Sea, Denmark and the Baltic Sea; on the e. by Russia and Austria-Hungary; on the s. by Austria-Hungary and Switzerland, and on the w. by France, Belgium and the Netherlands. Its length from east to west is 750 miles, and from north to south, 475 miles. The area is 208,830 square miles, or a little less than the combined areas of Colorado and Nevada. The coast line is 1200 miles in extent.

SURFACE AND DRAINAGE. Germany is naturally divided into three surface regions, the Alpine Foreland, the central highlands and the great plain. The first occupies the extreme southeastern portion of the country and contains a part of the Alps. There are found the highest elevations and the most rugged mountain scenery. To the north and west of this and separated from it by the basin of the Upper Danube is the central highland region, extending westward from the Carpathian Mountains to the Rhine and northward to within about 100 miles of the North Sea. The highland region is traversed by numerous ranges of low mountains, among the most important being the Harz, Riesengebirge, Vosges and Erzgebirge. All of these are low mountains with rounded summits which have been denuded of most of their soil. The valleys are comparatively shallow, having been filled with the debris carried from the mountains by ice. This portion of Germany

presents a diversified appearance of low mountains and broad valleys, and it is covered with a fine growth of vegetation and watered by numerous streams. To the north of the central highlands and occupying fully one-third of the country is the great plain, which extends from the eastern boundary to the North Sea. This is a portion of the great Asiatic plain, which covers a large part of eastern and northern Europe. This plain is not perfectly level; its highest portions are about 600 feet above sea level, and it has a gradual slope towards the north.

The rivers of Germany are divided by the central highland region into two systems, those flowing into the Black Sea and those flowing into the North and Baltic seas. Of the first system the Danube is by far the most important, and it drains only the southeastern portion of the Empire. The other system includes all of the other important rivers and drains most of the country. Going from the west eastward, these rivers, in order, are the Rhine, the Ems, the Weser and the Elbe, flowing into the North Sea; and the Oder and the Vistula, flowing into the Baltic. Of these the Rhine is the most important. It has its source in Switzerland and flows entirely across the country, as does the Elbe, which drains a good portion of Bohemia. The Weser and the Oder are limited to German territory, while the Vistula drains a large portion of Russia and simply finds an outlet through Germany. All of the important streams flowing into the Baltic empty into shallow lagoons, called *haffs*. Between the Oder and the Vistula are a number of less important streams, and the Memel drains the extreme northeastern section of the Empire.

The mountainous region in the south and southeast contains numerous lakes which in the clearness of their water and the picturesqueness of their surroundings resemble the lakes of Switzerland. In the lowlands in the northern and northeastern portion of the Empire there are also numerous shallow lakes. These have low shores, which rise gradually to the level of the surrounding country.

CLIMATE. Germany has a mild, temperate climate. The variation in temperature is more marked from west to east than from north to south. In general the temperature becomes lower as we pass from the southwest to the northeast, the altitude of the highland region offsetting in temperature whatever advantage might otherwise be gained by latitude. The western portion of the Empire has a higher annual temperature than the eastern, because of the influence of the

warm winds which blow from the Atlantic during a good portion of the year. The mean temperature for southern Germany in July is a little above 70°, while that for northern Germany is a little below 70°. The winter contrast between the western and eastern portions is noticeable in the condition of the rivers flowing into the North Sea and those flowing into the Baltic. The former are scarcely ever frozen, while the latter may be obstructed by ice for several weeks or even months. Because of the cold water in the Baltic, the spring in the northeastern portion of the Empire is cold and late.

The rainfall varies considerably in different localities, being heaviest in the mountain regions and along the western coast. In some sections it averages 40 inches per year, while in most regions the average is about 20 inches, and in a few localities it is less than this. The general average for the Empire is about 28 inches.

MINERAL RESOURCES. Germany is the leading country of the Continent in the production of coal and iron and is exceeded only by the United States and Great Britain among the countries of the world. The iron and coal regions are quite generally distributed over the country, but are most important among the highlands in the central and southern part. The greatest coal field is in the southwest and is an extension of the Belgian coal field. Other minerals of importance are silver, of which Germany produces about one-half of the entire output of Europe; copper, zinc, lead and nickel. Among the valuable stones are building stones of different kinds and lithograph stone. Salt is found in large quantities in some localities, as are compounds of potash, which are of great value in the manufacture of glass and other commodities.

AGRICULTURE. A little less than two-thirds of the land is devoted to agriculture, a little more than one-fourth of it is under forests and about one tenth is either unproductive or is covered by buildings. Agriculture is not the leading occupation, but it engages about one-third of the population. There is a greater variation in the size of farms than is found in France and Belgium, but the number of small farms is very large. There are over 3,000,000 farms with less than five acres each, while there are nearly a million ranging from 5 to 12 acres, and only a few exceed 250 acres. Many of the smallest farms are cultivated by those who devote a portion of their time to other occupations. The soil and climate are in general well adapted to agriculture, except in the northern and north-

eastern portions, and even here the scientific methods of fertilizing and tilling the soil enable the farmer to reap good returns for his labor. The products vary widely, because of difference in soil and climate. In the southern portion of the Empire corn, hops and fruits are the most important products, except on the higher elevations, where rye, oats and potatoes are extensively grown. The northern portion of the country is largely devoted to the growing of grains, among which rye takes the leading place, followed by oats. Here, also, as well as in the central portion of the Empire, extensive areas are devoted to the raising of sugar beets and potatoes. Considerable barley and wheat are grown in these regions. The valleys of the Rhine, Moselle and a few other rivers are devoted almost entirely to the culture of the grape and the production of wine, and Rhine wines, because of their excellence, have become known throughout the world. In general, the most improved tools and agricultural implements are used, and the latest and most effective methods are employed by the German farmers, all of whom have received more or less technical education which they add to their practical experience in managing their farms. A very large proportion of the farms are tilled by the owners.

MANUFACTURES. Germany is one of the leading manufacturing countries of the world, being foremost upon the continent of Europe and exceeded only by the United States and the United Kingdom. The manufacturing industries include a great variety and are very generally distributed over the Empire. First in importance among these is the manufacture of textiles, including cotton, woolen and silk goods. Following these is the manufacture of iron and steel and their various products. In the production of some iron and steel goods Germany leads the world, particularly in the manufacture of hardware, including cutlery and tools, certain forms of heavy machinery and other articles, such as marine engines, heavy artillery and armor plate for battleships. The manufacture of chemicals, scientific instruments and small wares is also important, and in each of these lines the Germans exhibit great skill. Their scientific instruments are considered the most accurate in the world. Other important industries include brewing, dyeing, wood carving, type founding and the manufacture of jewelry, gold and silver ware and printers' supplies.

TRANSPORTATION. The Rhine, the Weser, the Oder, the Elbe and the Vistula are all navigable

for long distances. Many of the other streams have been canalized, and all important navigable rivers are connected by canals, so that the Empire has a complete and convenient system of waterways, while the construction of the canal across the peninsula of Jutland has afforded a convenient and short outlet from the Baltic to the Atlantic (See KAISER WILHELM CANAL). The railway system is one of the most complete in the world and comprises about 39,000 miles, being exceeded only by the railroad systems of Russia and the United States. The railways of Germany are under a peculiar form of management, almost every system being managed by the government of the state in which the larger part of the system is located. Berlin is the great railway center, and from this city trunk lines extend not only to important points in the Empire but to all important cities of Europe. They are so numerous and so well managed that any point in the Empire can be reached within twenty-four hours. Carriage roads are numerous and good, and telegraph lines, telephone lines and the best of mail service are maintained by the government.

COMMERCE. Germany is one of the great commercial nations. The excellence of her manufactured products and the systematic method of introducing these to the various countries have enabled her to develop an extensive foreign trade. Her leading exports consist of manufactured goods, particularly textiles, iron and steel products, chemicals, dyes, malt liquors, scientific instruments, small wares, jewelry and gold and silver ware, while the chief imports consist of food stuffs and raw material for the manufactures. Large quantities of wheat are obtained from Russia, and the greater portion of the supply of cotton is imported from the United States. The annual foreign trade amounts to about \$2,500,000,000. Of this, the imports exceed the exports by about \$300,000,000. The chief countries with which this trade is carried on are the United Kingdom, the United States, Russia, France, Belgium, Netherlands and the countries of South America.

INHABITANTS AND LANGUAGE. The German people are principally of Teutonic origin, but those inhabiting some portions of the Empire are descendants from the Teutons and Celts. The people of the northern states are generally characterized by light hair and blue eyes, while those of the southern states, where the Celtic element is found, are of darker complexion. There are also in the Empire some Slavs and some Poles.

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The German language prevails, but the people inhabiting the lowlands of the North speak a different dialect from those in South Germany. Because North Germany is known as a low country and South Germany as a highland country, these dialects are usually distinguished as Low German and High German. The High German is in most general use and is gradually replacing the other dialect. See GERMAN LANGUAGE.

EDUCATION. Germany maintains one of the best systems of public education in the world, if not the best. For a detailed description, see EDUCATION, NATIONAL SYSTEMS OF, subhead *Germany*; UNIVERSITY, subhead *German Universities*.

LITERATURE AND ART. See LITERATURE, subhead *German Literature*; PAINTING; SCULPTURE, subhead *Germany*; ARCHITECTURE.

COLONIES. The German colonial possessions are located in Africa, Asia and the Pacific Ocean. Their area and estimated population are given in the following table:

GERMANY'S COLONIES AND DEPENDENCIES	ESTIMATED AREA* IN SQ. MILES	ESTIMATED POPULATION
IN AFRICA:		
Togoland.....	33,700	1,000,000
Kamerun.....	191,130	3,500,000
German Southwest Africa..	322,450	200,000
German East Africa.....	384,180	6,703,000
IN ASIA:		
Kiauchau (exclusive of the bay).....	200	32,000
IN THE PACIFIC:		
Kaiser Wilhelm's Land....	70,000	110,000
Bismark Archipelago.....	20,000	200,000
Caroline Islands..... }		
Palau or Pelew Islands..... }	560	60,000
Marianne Islands..... }	250	2,000
Solomon Islands.....	4,200	45,000
Marshall Islands.....	150	15,000
Samoa Islands:		
Savaii.....	660 }	34,400
Upolu.....	340 }	
Total.....	1,027,820	11,901,400

*The areas of these territories, especially those in Africa, are only approximately correct, in many cases, since the boundaries have not yet been definitely settled.

GOVERNMENT AND RELIGION. The German Empire is a federated state, comprising four kingdoms: Prussia, Bavaria, Württemberg and Saxony; seven grand duchies: Baden, Mecklenburg-Schwerin, Hesse, Oldenburg, Brunswick, Saxe-Weimar and Mecklenburg-Strelitz; four duchies: Saxe-Meiningen, Anhalt, Saxe-Coburg and Saxe-Altenburg; seven principalities: Waldeck, Lippe, Schwarzburg, Rudolstadt, Schwarzburg-Sondershausen, Reuss-Schleiz, Schaumburg-Lippe and Reuss-Greiz; three free cities:

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Hamburg, Lübeck and Bremen, and the imperial province of Alsace-Lorraine. These states are federated under the constitution which was adopted in 1871. According to the agreements of federation some states enjoyed privileges not granted to others, since these concessions were necessary to induce them to join the confederation. The king of Prussia is by the constitution made president of the German Empire, with the title of emperor. His office is somewhat peculiar. It is hereditary in the male branch of the royal family of Prussia, and the emperor cannot be removed. He is not heir to a throne, but to an office. He summons, opens, adjourns and closes the houses of the federal legislature, appoints and removes the imperial chancellor and other high imperial officers, controls foreign affairs of the Empire and is commander in chief of the imperial army. He may, without consulting the legislature, engage in defensive war, but must have its approval to engage in offensive war. In addition to his duties as emperor, he has other duties and responsibilities as king of Prussia.

The chief executive officer under the emperor is the chancellor, who is appointed and removed by the emperor at will. The chancellor is chairman of the *Bundesrat*, or upper house of the legislature, is required to countersign all acts of the emperor except those which pertain to military affairs, and in so doing he assumes the responsibility for the acts, thus making the emperor irresponsible. He also, with the advice and consent of the emperor, appoints and removes all of the minor imperial officers and sees that the laws are promulgated and enforced, though the power of declaring a law suitable for promulgation lies with the emperor. The chancellor has a seat in the lower house of the legislature, or *Reichstag*, where his position is that of the defender of the government and the advocate of its measures. He is assisted in his duties by eleven secretaries, each of whom is at the head of a department of the government.

The legislative department of the Empire is vested in two houses. The *Bundesrat*, or upper house, is really a federal council and comprises a body of ambassadors sent by the different states. The members of this body can vote only in accordance with instructions which they receive from their respective states, and if they vote contrary to such instructions or without instructions on important questions the vote is not counted. The lower house, or *Reichstag*, is composed of members elected by popular vote for five years. This body is really the active

legislative branch of the government, as most measures originate in it and all must receive its sanction before they can become laws. The emperor is required to call the Reichstag together at least once a year, and he may adjourn it once during any session, provided the adjournment is for a period not exceeding thirty days. Under extreme circumstances the emperor, acting with the Bundesrat, may dissolve the Reichstag and call for a new election. In such case the election must be held within sixty days and the newly elected body must assemble within ninety days from the date of dissolution. Suffrage is restricted to men twenty-five years of age and over. There are also a few minor restrictions in regard to crime, military service and inability to pay taxes.

The judicial department of the Empire is provided for by statute and not by the constitution. The only imperial court provided for in the constitution is the Federal Council, or Bundesrat, which has authority to settle questions in dispute between the different states and the Empire. A uniform system of courts and criminal law was created in 1877 and the years immediately following. In accordance with this system four grades of courts were established, the lowest being the district court, which takes cognizance of petty cases, both civil and criminal, similar to those tried in justice courts in the United States. The courts of next higher grade are known as territorial courts and consist of from three to five judges. These hear cases appealed from lower courts and have original jurisdiction in civil and criminal cases of greater magnitude. In the trial of important criminal cases juries are employed. Above the territorial courts are the superior courts, which are wholly courts of appeal, and at the head of the system is the imperial court, which is located at Leipzig and is composed of 90 judges, divided into 4 criminal and 6 civil senates. The judges of this court are appointed by the emperor upon nomination by the Federal Council and their office is for life.

The affairs of the different states are managed by their own system of laws and the officials which they elect. In case such laws conflict with the imperial decrees they must be amended or repealed.

CITIES. Germany is a densely populated country and in 1911 had twenty-three cities with a population of over 200,000. The largest, in the order of their importance, were Berlin, the capital, Hamburg, Munich, Leipzig, Dresden, Breslau, Cologne, Frankfurt, Nuremberg, Hanover,

Magdeburg, Düsseldorf, Chemnitz, Stettin and Essen, each of which is described under its title.

HISTORY. Although mention is made as early as the time of Alexander the Great of German tribes on the Baltic coast, the first important occurrence in connection with them of which we have any authentic record was their defeat of the Roman consul Papirius, in 113 B. C. In 102 B. C. the Teutones were defeated by the Roman general Marius. Julius Caesar, in his *Commentaries*, gives an account of certain Germanic tribes whom he found between the Rhine and the Vosges, and he came into conflict in Gaul with a German king, Ariovistus. The name Germani was not used by the Germans in reference to themselves, but was probably formed by the Romans from a Gallic word. At various times in Roman history the Romans were concerned with different German tribes, and by the beginning of the Christian era Roman dominion had been firmly established in Germany. When an attempt was made in 9 A. D. to force Roman customs upon the German peoples, they rebelled under the leadership of Arminius (See ARMINIUS) and completely defeated the Romans.

The Romans never again established themselves in Germany, and in the early centuries of the Christian era they were often forced to defend themselves against the invasions of powerful German tribes, chief among whom were the Alemanni, the Franks, and later, the Vandals, the Suevi, the Goths and the Lombards. Tacitus, in his *Germania*, gives a valuable and interesting account of the customs and lives of the early Germans. By 486 the ambitious Frankish chief Clovis had defeated the Romans in Gaul, and had set up his court on the future site of Paris. From the time of Clovis to the Treaty of Verdun in 843, the history of Germany is identical with that of France (See FRANCE, subhead *History*; CHARLEMAGNE). By the Treaty of Verdun, Louis, the son of Louis the Pious, Charlemagne's son, received that division of Charlemagne's great empire which corresponded to modern Germany, and at that time the history of Germany as a separate country began. Louis reigned until 876 and made some advancement toward national unity. The son of Louis, Charles the Fat, succeeded for a time in reuniting the three kingdoms—France, Italy and Germany—but as he was unable to defend his empire against the Northmen, the nobles deposed him and elected his nephew, Arnulf, in his stead (887). On the death of Louis the Child, the last of the Carlo-

vingian dynasty, Conrad of Franconia was elected king. His reign was occupied with futile attempts to protect Germany against the invading Hungarians, and also with his quarrels with his powerful nobles. The most powerful of these, Henry of Saxony, succeeded Conrad in 919 as Henry I (the Fowler), first of the Saxon line. He is considered the creator of the German Empire. He united the dukedoms under his rule, built fortresses, reformed the military system and defeated the Wends and Hungarians. Otto I, son of Henry, came to the throne on his father's death in 936, and under him the royal power was greatly increased. He restricted the power of the nobles, defeated the Hungarians on the Lech in 955, acquired the crown of the Lombards in 961 and in the following year assumed the imperial title, thus founding the Holy Roman Empire, which existed until 1806 (See HOLY ROMAN EMPIRE).

Otto reigned until 973 and was succeeded by his son, Otto II (973-983), a well-meaning but somewhat weak monarch. Under Otto III, a young and enthusiastic king who was desirous of setting up a world empire with Rome as its capital, Germany was greatly neglected for Italy, and thus a condition of anarchy grew up. Henry II (1002-1024), the last king of the Saxon house, devoted more of his attention to his German than to his Italian possessions, and matters mended somewhat in Germany.

The first of the Franconian kings, Conrad II (1024-1039), was an energetic monarch who subdued the nobles and recovered the lands of the crown, and his work was carried on ably by his son, Henry III (1039-1056). During the reign of Henry III the right of the pope to interfere constantly in the affairs of the Empire was seriously questioned, and had Henry lived longer he might have put an end to this interference. His son, Henry IV, was an able king, but his constant troubles with the pope allowed his great nobles to increase greatly their own powers (See HENRY IV, Holy Roman emperor). The decline of the royal power continued under Henry V (1106-1125) and Lothair (1125-1137), so that the title of emperor became almost an empty honor.

The period of the Hohenstaufen emperors, which began in 1138, is the most famous in medieval German history. It is marked by a bitter conflict between the imperial and the papal powers and by the beginning of the Crusades. Conrad III (1138-1152), the first of the Hohenstaufen emperors, took part in the

Second Crusade, and Frederick Barbarossa (See FREDERICK I, Barbarossa), one of the ablest of the Hohenstaufen emperors, was drowned during the Third Crusade. Frederick's son, Henry VI (1190-1197), by marriage inherited the kingdom of Naples and Sicily, which remained in possession of the Hohenstaufens until 1265. The possession of this territory by the emperors was a great injury to Germany, because it led them to neglect their German subjects. Henry VI attempted to make the imperial crown hereditary. The remaining kings of this line were Philip of Suabia (1198-1208), Frederick II (1215-1250) and Conrad IV (1250-1254). The period is filled with contentions with the popes and the Italian cities and with constant internal strife. The royal power became insignificant, and neither German king nor Roman emperor in reality existed. Some of the rulers seemed little concerned about Germany, dividing their time between Sicily and the Crusades, and Frederick II, one of the ablest of medieval rulers, was not in Germany for fifteen consecutive years.

The period between the death of Conrad IV in 1254 and the election of Rudolph of Hapsburg in 1273 is known as the Great Interregnum. The right to choose the emperor had been gradually usurped by a few of the powerful nobles, who were called electors, and on the extinction of the Hohenstaufen line these electors practically offered the crown for sale. Various bidders appeared, and the two offering the largest bribes, Richard of Cornwall and Alphonso of Castile, were elected, but neither of them was crowned emperor at Rome nor acquired any real power. Finally, in 1272, the pope ordered a new election, and in the following year Rudolph I (1273-1291), of the House of Hapsburg, was raised to the throne. He in a measure restored order and strengthened the royal authority. Through his defeat of Ottokar II of Bohemia he acquired lands in southeastern Germany, the most important being Austria. This his son Albert received with the title of duke, and from this dates the rise of Austria and the House of Hapsburg (See AUSTRIA-HUNGARY, subhead *History*). During the fourteenth and part of the fifteenth centuries there was but little of interest in the history of Germany. The imperial crown was passed around from one house to another and was openly offered to the highest bidder, the only care of the electors being to choose a prince not strong enough to endanger their authority. At one

time there were three rival emperors ruling simultaneously. The first noteworthy event, besides the revolt of the Swiss, was the promulgation in 1356 by Charles IV (1348-1378) of the Golden Bull, which secured to four secular and three ecclesiastical princes the right of election and defined their power. This decree was in force till 1806. Another noteworthy event was the war of the Hussites (See HUSSTITES).

In 1438 Albert II of Austria was elected emperor, and from this time until the dissolution of the Empire in 1806 the crown was regarded as hereditary in the Hapsburg family, although the electors always made a formal choice. The greatest of the Hapsburg emperors in the Middle Ages was Maximilian I (1493-1519) (See MAXIMILIAN I). His reign marks a strong tendency toward centralization and the material growth of the imperial authority. He was succeeded by his grandson, Charles V (1519-1556). Charles bestowed the Austrian possessions of the House of Hapsburg on his brother Ferdinand, who may be said to have founded the monarchy of Austria-Hungary. (For the events of this important reign see CHARLES V, Holy Roman emperor; REFORMATION, THE; LUTHER, MARTIN.) The Peace of Augsburg (1555), with which the struggle between the Catholics and Protestants for the time terminated, granted to the Lutheran states the right to establish the Protestant worship. Three provisions of the Peace of Augsburg were later the cause of much trouble. These were the provision that each prince could choose his state religion and banish all subjects not conforming to it; that any ecclesiastical prince on becoming a Protestant was required to give up office and lands, and that all lands not secularized in 1552 should forever belong to the Catholics.

During the reign of Charles's successor, Ferdinand (1556-1564), a counter reformation was begun by the Roman Catholics, and this movement spread rapidly and was continued during the reigns of Maximilian II (1564-1576) and Rudolph II (1576-1612). While Matthias (1612-1619) was on the throne, his cousin Ferdinand was crowned king of Bohemia (1617), and the attempt to force the Protestants of that country to accept him as their ruler led to the outbreak of the Thirty Years' War (1618-1648) (See THIRTY YEARS' WAR). The struggle closed in the reign of Ferdinand III, by the Peace of Westphalia (See WESTPHALIA, PEACE OF). Germany by this treaty was cut up into

over two hundred independent states, which owed only a nominal support to the emperor and which became in fact simply petty monarchies. The imperial authority was completely wrecked and never afterward recovered. The war had devastated and impoverished Germany beyond measure, national feeling had been crushed out and all unity had been destroyed. Most of the rulers of the states were despots, who desired only to pattern themselves after Louis XIV, the absolute monarch of France. The War of the Palatinate (1689-1697), undertaken by Louis XIV, increased the desolation of the country.

The interest of German history after the Treaty of Westphalia centers largely in the rise of Prussia (See PRUSSIA, subhead *History*). The Great Elector, Frederick William (1640-1688) gained increased territory for his state, and by strengthening the royal authority and forming a standing army brought Prussia rapidly forward. His son Frederick III (1688-1713), added to his title of elector of Brandenburg that of king of Prussia (1701). Nominally, the king of Prussia was still subject to the emperor, but from this time on, the emperors were in fact merely rulers of Austria, and the imperial dignity was but an empty honor. With the death of Charles VI (1711-1740), the male Hapsburg line became extinct. The attempt of Charles to secure by the Pragmatic Sanction his dominions to his daughter Maria Theresa, brought on the War of Austrian Succession (See SUCCESSION WARS). After a two years' interregnum, the electors chose Charles VII of Bavaria as emperor (1742-1745), and on his death Maria Theresa's husband, Francis I (1745-1765), was elected. His successor, Joseph II (1765-1790), tried to establish the imperial authority in southern Germany, but was prevented by Prussia. In 1756 war broke out between Maria Theresa and Frederick the Great of Prussia (1740-1786). The advantage was decidedly with Frederick, and under this great ruler, whose statesmanship was as remarkable as his generalship, Prussia became the equal of Austria and showed herself as the one possible center for a united Germany. The French Revolution destroyed the remnant of the Empire, and after the formation by a number of German states in 1806 of the Confederation of the Rhine, under the protectorate of Napoleon, Francis II formally resigned the imperial crown and the Holy Roman Empire ceased to exist.

Napoleon's plan to add Germany, or at least

the states of the Confederation, to his empire, was frustrated, and at the Congress of Vienna, which met to restore order out of the chaos into which European affairs had been plunged, the German states were organized as a confederation, with the emperor of Austria as president (1815). The various German states were independent in internal affairs, and interstate disputes were to be settled by a diet. Each state was to have a constitutional form of government, but this provision was little observed until the revolutions of 1830 and 1848 forced the German rulers to accede to the demands of their subjects. In 1830 was formed the Zollverein, which secured free trade among the several states. In 1848 a national assembly met at Berlin for the purpose of framing a national constitution, but the rivalry of Austria and Prussia prevented any successful results, and the Prussian king, Frederick William IV, refused the offer of the title of emperor of the Germans. Frederick William IV was succeeded in 1861 by William I (1861-1888), who soon called into his ministry Bismarck (See BISMARCK-SCHONHAUSEN, KARL OTTO EDUARD LEOPOLD VON, Prince). His policy of "blood and iron" made possible the final firm union of the German nation. The rivalry between Prussia and Austria was encouraged by Bismarck, who was making ready for the struggle which he knew would come. The final cause of the outbreak was the contention over Schleswig-Holstein, which had been taken from Christian IX of Denmark (See DENMARK, subhead *History*). War began between Austria and Prussia in 1866 (See SEVEN WEEKS' WAR). The outcome was complete success for Prussia, and in 1867 the North German Confederation was formed, with the king of Prussia as president. The Catholic states of the south, Bavaria, Baden and Württemberg, held aloof. Just before the close of the Franco-German War, they joined the Confederation. The cause of this war was the hatred and jealousy with which France viewed the rising power of the Hohenzollerns (See FRANCO-GERMAN WAR).

By the treaty which followed the Prussian victories, France lost Alsace and Lorraine and was compelled to pay a large indemnity. The most important result to Germany, however, was the enthusiasm and the spirit of nationality awakened by the Prussian success. The German Confederation was changed to the German Empire, and William I, king of Prussia, was proclaimed German emperor on January 18, 1871. The title was to be hereditary in his

family, and it descended at his death to his son, Frederick III. Frederick III lived but a few months after his accession and was succeeded by his son, William II. William at once showed his intention to keep personal control of the government and accordingly in 1890 dismissed Bismarck, who did not approve of his policy.

About 1883 Bismarck aided in the formation of the Triple Alliance, which included Prussia, Austria-Hungary and Italy, and this was renewed in 1891 by Caprivi, the successor of Bismarck. Caprivi was succeeded in 1894 by Hohenlohe, during whose chancellorship rapid progress was made in the extension of German dominion in Africa. The murder in 1898 of two German missionaries in China gave Germany a pretext for demanding the cession of the port of Kiaochau in Shantung, China, and the murder of the German ambassador in Peking in 1900 compelled Germany to take a prominent part in the expedition of the European powers against China. Under Count von Bulow and Theobald von Bethmann-Hollweg, the succeeding chancellors, Germany's vigorous foreign policy was continued. In 1914 Germany's support of Austria's attitude toward Serbia led to a general European war. See AUSTRIA-HUNGARY, subhead *History*; WAR OF THE NATIONS. Population in 1910, 64,896,881.

Germination, *jur min a'shun*, the term primarily used to denote the first growth of a plant from its seed, and, in general, to signify the development of germs, either vegetable or animal. The seed contains two parts, the *embryo*, or miniature plant, and the *cotyledons*, or seed leaves, in which the food for the embryo is stored. Some seeds, such as the squash and pea, have two cotyledons; some, like those of Indian corn and wheat, have but one, while others, like those of the pine family, have more than two.

Germination depends upon certain conditions of heat, light, air and moisture. These vary for different species, and to some extent within the same species. Indian corn will not germinate in a temperature below 48° F. nor above 115.2° F., while about 98° is the temperature that secures the most favorable results. Wheat has a range extending from 41° to 108.5°, with about 84° as the most favorable temperature.



BEAN

The bean and squash afford good examples of one type of germination for seeds having two cotyledons. In the bean the nourishment is stored in the cotyledons in such a way that these appear above ground with but slight changes in form or color. As the nourishment is absorbed these leaves wither and fall; in the meantime the first pair of true leaves has developed and the root has taken hold on the soil, so that the plant is prepared to obtain its nourishment from the earth and air.

The pea represents another type of dicotyledonous seeds. Here the cotyledons are so full of nourishment that they cannot appear as leaves at all; they consequently remain in the ground while their nourishment is absorbed. In this type of germination, the first leaf that appears is a true leaf of the plant.

Indian corn affords a good illustration of the germination of seeds having only one cotyledon. In this case the nourishment is stored at one end of the seed, the large end of the kernel; it is absorbed while the seed remains under ground, as in case of the pea, and the first leaf appearing is a true leaf of the plant.

The plant food is stored in the seed in the form of starch and albumen, both of which are insoluble. Before these substances can be available for nourishment they must be changed into soluble compounds. When the seed is planted, it absorbs moisture and swells; fermentation sets in, oxygen is absorbed and the starch is changed to sugar and dextrin, both of which are soluble. These chemical changes are accompanied with a rise of temperature. After a few days the seed bursts open, and the sprout or plumule appears. This is frequently called the radicle, though it is not the root. The direction of the plumule is at first downward, but it soon bends upward, and at the point of curvature it sends out a second shoot, which forms the rootlet.

Germs, jurmz, in medicine, tiny organisms, either plant or animal, believed to have some relation to disease. See BACTERIA AND BACTERIOLOGY; GERM THEORY OF DISEASE; DISEASES OF PLANTS.

Germ Theory of Disease, the theory that certain diseases are communicated from an infected person to an uninfected one by living organisms, which gain access to the body of the afflicted person by the air, food or drink, and which, growing and multiplying in the body they invade, produce changes characteristic of special diseases. The period during which the organisms retain their vitality, like the rate of their growth and multiplication, varies in different cases, but it is limited in all. Few, if any, resist the destructive influence of a temperature of 300° F., while most succumb at the temperature of 200° or even less, particularly if exposed for some time. Animal poisons generally are destroyed by boiling, and clothes, sheets or whatever is infected, may be rendered pure by being exposed to a temperature of 300° F. The living organisms, known as bacteria, microbes, micro-organisms or germs, are divided into several classes (See BACTERIA AND BACTERIOLOGY).

Doctor Koch, of Berlin, published in 1876 a paper giving a full account of the life history of the organism which had been observed in animals dead of splenic fever; and in 1877 the great French chemist Pasteur proceeded to investigate the subject, and his investigations conclusively support the germ theory of disease. In 1882 Doctor Koch announced the discovery of a micro-organism believed to be the chief, if not the only, cause of consumption of the lungs. These microbes are found not only in the lungs of persons who have died of tuberculosis, but also in the spit of tubercular and consumptive patients, and they multiply by spores. Thus it is that the spit of a consumptive patient, even after it has dried up, may be capable of imparting the disease, owing to spores being scattered in the air. After the epidemic of cholera in Egypt in 1883, which spread to France and Italy, investigations were undertaken by French, German and British commissioners. Doctor Koch detected a peculiar bacillus, shaped like a comma (,), in the intestines of persons who had died of cholera and he believed that this bacillus was the active agent in the production of the disease. In similar fashion diphtheria, lockjaw, pneumonia, typhoid fever and other diseases have been proved to be of bacterial origin. Hydrophobia, measles, scarlet fever, smallpox and whooping cough and other diseases are attributed to germs which have not yet been fully identified. Indeed, investigation seems to point to the fact that every infectious or contagious disease is



PEA AND CORN

due to some form of micro-organism, and that there is one particular organism for each particular disease. Each organism produces its own disease and none other; and the special disease cannot arise unless its germ has gained entrance to the body. The channels through which these germs obtain entrance are innumerable, but they have one origin and one only, and that is a preceding case of disease. The "germ theory" affords the hope and suggestion of a method of diminishing, if not of getting rid of, such diseases altogether, and to some extent it also indicates the direction in which their cure is to be sought. If the particular microbe of each contagious disease were known, the condition of its life and activity understood, there is great probability that its multiplication in the living body could be arrested and the disease could thus be cured. Even without such knowledge, however, the germ theory indicates that the means for arresting the spread of contagious diseases and diminishing their occurrence consist in preventing the spread of the germs from an existing case of disease. See ANTISEPTIC; SANITARY SCIENCE; SURGERY.

Gérôme, *zha romé'*, JEAN LEON (1824-1904), a French artist, born at Vesoul. He went to Paris and studied under Paul Delaroche. In 1853 he traveled in the East, where he obtained the material for most of his pictures. Among his famous paintings are *Gladiators before Caesar*, *Slave Market at Rome*, *Cleopatra and Caesar* and *The Duel after the Ball*. Gérôme was also noted as a sculptor.

Geronimo, *je ron'i mo* (?-1909), an Apache chief, who in the years 1884-1886 terrorized the settlers in New Mexico and Arizona. In the latter year General Crook with a force of regulars was sent against Geronimo's band. The terms of surrender were agreed upon, but before they could be carried out the Indians had escaped. General Miles, who succeeded Crook, organized a vigorous campaign, and a detachment of his troops captured Geronimo, who was sent to Fort Pickens, Fla. Later he was sent to Fort Sill, Okla.

Gerry, ELBRIDGE (1744-1814), an American statesman, born in Marblehead, Mass. He graduated at Harvard in 1765 and was elected to the Massachusetts Assembly in 1773. He was a member of the Continental Congress of 1776 and served on several important committees. Gerry was a delegate to the constitutional convention, but did not approve of the instrument and refused to sign it. In 1789 the Anti-Federalist party elected him to the first national

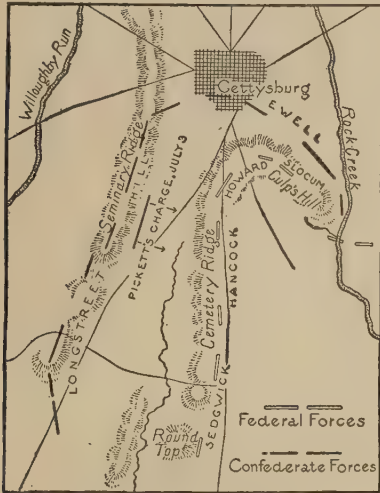
Congress. He was one of the envoys sent in 1797 to establish diplomatic relations with France. His colleagues, Marshall and Pinckney, being Federalists and out of sympathy with France, were ordered to quit France, but Gerry was permitted to remain; and he did remain, to the indignation of many Americans, until his recall was ordered. Elected governor of Massachusetts in 1810, Gerry, who was a keen partisan, replaced Federalist office-holders with Republicans and also unfairly rearranged the districts of the state so as to secure the advantage to his own party—a maneuver for which his opponents coined the word *gerrymander*, and which has since been frequently used. He was defeated in 1812, but his party rewarded his zeal by electing him to the vice-presidency of the United States, in which office he died.

Ger'ryman/der, a word used in the United States to denote an unfair distribution of election districts within a state. The word was first used in 1812, when, under the administration of Governor Elbridge Gerry, the Republicans and Federalists being nearly equal in strength in Massachusetts, a redistribution of senatorial districts was made, so that those counties that returned large Federalist majorities were grouped together, thus reducing the representation of the Federalist party in the legislature. One district under the new law was so irregular in outline that it somewhat resembled a salamander, hence the name *gerrymander*. This scheme for perpetuating the power of a political party has frequently been used since that time.

Gethsem'ane (oil press), an olive garden or orchard in the neighborhood of Jerusalem, memorable as the scene of the last sufferings of Jesus Christ. The traditional site of this garden is on the east side of the city, a little beyond the Kedron, near the base of Mount Olivet. It contains some very old olive trees, piously regarded as having stood there in the time of Christ, but it is claimed all the trees were cut down during the siege of Jerusalem by Titus. The nearly square garden has been enclosed by the Latins, while the Greeks have enclosed a smaller space a little farther north as the true site of Gethsemane.

Get'tysburg, BATTLE OF, a decisive battle of the American Civil War, fought July 1-3, 1863, at Gettysburg, Pa., between the Federal army of the Potomac, numbering about 93,000 men, under General Meade, and the Confederate army of Northern Virginia, numbering about 80,000 men, under General Lee. On July 1, the two armies came together at the little village

of Gettysburg, the Federals having closely followed the Confederates in their advance northward from Fredericksburg. The Federals occupied a strong position on a line of bluffs south of the town; the Confederates formed their lines on a parallel ridge, about a mile distant. On July 2, the Confederates made a vigorous attack, drove back the Union left and gained a position on the right which seriously menaced the whole line. On the morning of the third, the Northern soldiers drove the Confederates out of this advanced position and repulsed a brilliant



BATTLE OF GETTYSBURG

charge by Pickett's men against the center of the line on Cemetery Ridge. Lee was therefore compelled to retreat across the Potomac. This battle marked a turning point in the Civil War. Thereafter the fortunes of the South gradually failed. The total loss on the Federal side was 3072 killed, 14,497 wounded and 5434 captured or missing. The loss on the Confederate side was 2592 killed, 12,709 wounded and 5150 captured or missing. See CIVIL WAR IN AMERICA. Consult Doubleday's *Chancellorsville and Gettysburg* in the Campaigns of the Civil War series.

Geyser, *gi'zur*, a spring which at intervals throws out quantities of hot water and steam. A geyser has a funnel-like opening, which extends to hot rocks below the surface. It was probably formed by the water which, when hot, dissolved the siliceous matter. The eruptions occur at intervals, being regular in some geysers and very irregular in others. They are usually more frequent in small than in large springs. Various theories have been advanced to account

for the eruption, but all agree that it is caused by steam, the difference in theories being as to the way in which the steam acts. It is altogether probable that as the opening fills with water and becomes closed, the pressure causes the water at the bottom to become hot far above the boiling point (See BOILING POINT) at the surface. The temperature continues to increase until finally a small portion of steam escapes and forces some of the water out of the funnel. This in a measure relieves the pressure and the high temperature of the water causes it instantly to be converted into steam, which forces the water out through the funnel, often throwing it to the height of two hundred feet or more. The duration of an eruption varies from a few minutes in a small geyser to some hours in the largest. The water holds siliceous matter and carbonate of lime, which it deposits about the crater, making beautiful and fantastic formations, varying in color from white to blue and yellow.

The geyser regions of the world are found in Iceland, New Zealand, and in and about Yellowstone National Park in the United States. The last is by far the most remarkable and the most widely known. In 1904 a new geyser made its appearance in New Zealand, which is claimed to be larger than any other in the world. For a description of the geyser region of the Yellowstone, see YELLOWSTONE NATIONAL PARK.

Ghats, *gahts*, or **Ghauts**, two ranges of mountains in the peninsular portion of Hindustan. The general elevation of the Western Ghats varies from 4000 to 7000 feet. They form a watershed, and the rain collected on the eastern slopes makes its way across India to the Bay of Bengal. The Eastern Ghats have an average height of 1500 feet and extend for a distance of 500 miles.

Ghazzeh, *gaz'za*. See GAZA.

Ghebers, *ge'burz*, **Gabers**, *ga'burz*, or **Guebers**, a name given to the fire worshippers of Persia, represented in India by the Parsees. The original Ghebers or followers of Zoroaster are now represented almost solely by the few who inhabit the cities of Yezd and Kirman and the adjoining villages. As supreme deity they recognize Ahuramazda or Ormuzd, the principle of light and source of all that is good; and his opposite and antagonist, Ahriman, is the evil principle. Among the leading practices of the Ghebers may be mentioned their refusal to contract marriages with those of other creeds, their objection to eating beef or pork or to partaking of anything cooked by one of another religion.

When, in 1651 A. D., Yezdegird, the last of the Sassanides, was defeated by the caliph Omar, the majority of the Persians embraced Islamism. Those who continued Zoroastrians received the name of Ghebers, or infidels, and were subjected to persecutions so severe that the majority emigrated to India, where they became known as Parsees.

Ghent, *gent*, not *jent*, a town in Belgium, capital of the province of East Flanders, situated in a fertile plain at the junction of the Lys and Scheldt rivers, 31 mi. n. w. of Brussels. It is more than 8 miles in circumference and is divided by canals into a number of islands, connected with one another by bridges. Among the notable buildings are the Cathedral of Saint Bavon; the Church of Saint Nicholas (begun in the tenth century); the Church of Saint Michael; the university, a handsome modern structure with a library of about 100,000 volumes and 700 manuscripts; the Hôtel-de-Ville; the townhall; the Palace of Justice, and the Institute of Sciences. It also has many parks, gardens and promenades. Ghent has long been celebrated as a manufacturing town, especially for its cotton and linen goods and lace, but it has declined decidedly in importance in recent years. Other industries of importance are sugar refining and the making of hosiery, thread, ribbons, instruments in steel, carriages, paper, hats and delft ware, and the raising and exportation of flowers. Ghent was founded before the seventh century, was fortified by Baldwin, first count of Flanders, in the ninth century, and took a prominent part in European history, especially in the struggle for religious and political liberty. In 1792 the Netherlands fell under the power of France, and Ghent became the capital of the Department of Escaut (Scheldt). In 1814 it became, along with Flanders, part of the Netherlands, till the separation of Belgium and Holland. The treaty which ended the War of 1812 was signed here. Population in 1910, 166,445; with suburbs, 210,428.

Ghent, TREATY OF, between the United States and Great Britain, at the end of the War of 1812, signed December 24, 1814, and ratified February 17, 1815. It restored all territory to its position at the beginning of the struggle, provided for commissions to settle the boundary by the treaty of 1783 and bound both parties to attempt the abolition of the slave trade. It failed, however, to dispose of the chief causes of the war, including the impressment of American seamen, the participation of Americans in Newfoundland fisheries and the rights of neutrals.

Ghibellines, *gib'el linz*. See GUELPHS AND Ghibellines.

Ghiberti, *ge bair'te*, LORENZO (1378-1455), an Italian goldsmith and sculptor, born at Florence. His first work of importance was the painting of frescoes at Rimini, in the palace of Pandolfo Malatesta. In 1401 the priori of the society of merchants at Florence invited artists to propose models for the bronze doors of the baptistry of San Giovanni. The judges selected the works of Brunelleschi and Ghiberti, but Brunelleschi withdrew. After twenty-one years' labor Ghiberti completed the doors, and they were so greatly admired that he was requested to execute the east doors. Michelangelo said that they were worthy of adorning the entrance of paradise. The first door consists of twenty-eight panels, representing the life of Christ, the fathers of the church and the evangelists, far surpassing anything of the kind attempted since the days of the ancient Greeks. The reliefs on the east doors represented subjects from the old Testament, the finest being *Creation of Adam*, *Creation of Eve*, *Fall of Man*, *Expulsion from Paradise* and *Moses upon Sinai*. Among Ghiberti's other works are bas-reliefs, statues, and some excellent paintings on glass, most of which may be seen in the cathedral and the Church of Or San Michele at Florence. Ghiberti also figures as an architect, though he did not excel in this branch of art. His *Treatise in Architecture* shows a poor understanding of the art.

Ghirlandaio, **Ghirlandajo**, *geer'lan dah'yo*, or **Corradi Domenico** (1450-1495), one of the older Florentine painters, born at Florence. His first work of importance, frescoes in the Sistine Chapel, are excellent in composition and perspective. The figures are graceful and natural. Among his best works are the frescoes in the Sassetti Chapel of the Trinity Church and in the choir of Santa Maria Novella at Florence, the pictures in the Uffizi and in the academy at Florence, the *Last Supper*, *Saint Jerome*, *Coronation of the Virgin* and *Adoration of the Kings*.

Ghosts, the name given to the spirits of the dead as seen or imagined by living persons. A belief in the return of the dead in the form of ghosts is common to almost all races from the very earliest times. It has always had an important part in religious beliefs and has led to the development of various religious theories, such as ancestor worship, belief in immortality, witchcraft, nature worship and totemism. The original source of belief in ghosts is difficult to trace, and various theories have been proposed

Giants

concerning it. One group of scholars believes that the idea of the separation of the soul and the body was developed through the phenomena of dreams, in which, while the body is inactive, the mind or the soul apparently leaves the body and experiences strange sensations, even conversing with the dead. Ghosts assumed by course of development a terrible character. Being unlimited by the natural laws of the physical universe, they were able, it was thought, to pass instantly between places far removed from each other and to appear in a host of different forms. These beliefs led to the idea that ghosts possessed a remarkable superhuman power, and the greatest care was therefore exercised to secure the good will of departed spirits and to prevent them from exercising a malignant influence upon the living. Special fear was felt for the spirit of one who died a violent death or had been concerned with murder. This feeling still survives to a certain extent, as shown by the tales of haunted houses.

Giants, *giants*, people of extraordinary stature. History, both sacred and profane, makes mention of giants, and even of races of giants, but these tales are usually found only in the



GIANT IN BATTLE WITH ARTEMIS
From a relief in the Vatican, Rome.

records of an early stage of civilization, when the mind is apt to exaggerate anything unusual. The average height of men is about five feet five inches; but it may be said that each race has an average height of its own, which changes little from generation to generation and which often varies considerably from the general average of all men. Thus, the difference between the extremes, the Scotch (sixty-nine and five-tenths inches) and the Batwas of Africa (fifty-one inches) is over eighteen inches. Notable

Giants' Causeway

deviations from the medium height are not at all uncommon, especially among the Teutonic peoples. The following are among authentic instances, ancient and modern, of persons who attained to the stature of giants: the Roman emperor Maximinus, a Thracian, nearly nine feet in height; Patrick Cotter (1761-1804), ninety-nine inches; Anna Swan, a native of Nova Scotia, above eight feet high; her husband, Captain Bates, a native of Kentucky, of the same height; Chang-wu-gon, the Chinese giant, seven feet nine inches high. Probably the tallest man whose size is definitely recorded is a certain Finlander who reached the height of nine feet four inches. As a rule giants are comparatively feeble in body and mind, and they are usually short-lived. Gigantic stature is generally accompanied by a want of proportion in parts, some parts growing too quickly for others or continuing to grow after the others have ceased. The relation between the upper and lower half of the body is not disturbed, but the skull, brain and forehead are relatively small, the jaws very large, the shoulders, breast and haunches very broad and the muscular system comparatively weak.

The giants of Greek and Norse mythology were, of course, merely symbols, representing benignant or hostile forces of nature. Sometimes by the Greeks the term giant was applied to a man of great strength, even if he was not of gigantic size.

Giants' Causeway, *kaws'way*, a remarkable promontory, projecting from the north coast of Antrim, Ireland. It is formed by a mass of basalt from 300 to 500 feet in thickness. The causeway extends for about 300 yards and is formed of the tops of about 40,000 closely fitting basaltic columns, which have the form of six-sided prisms. The diameter of the columns varies from 15 to 20 inches, and each is divided into sections of nearly equal length. The entire structure is divided into three causeways, known as the Little Causeway, the Middle Causeway, or Honeycomb, and the Grand Causeway. The Little Causeway has a variety of pillars, some being hexagons, others octagons and still others pentagons. In the Middle Causeway an arrangement of columns forms a chair, known as the Wishing Chair, and the Grand Causeway contains a structure known as the Lady's Fan, from its resemblance to this article. Another arrangement of columns forms the Giants' Loom, and still another, the Giants' Well. The promontory takes its name from an

Gibbon

ancient legend which attributed its construction to giants, who commenced to build a road across the channel to Scotland.

Gibbon, a name commonly applied to the tailless monkeys which inhabit the islands of



GIBBON

the Indian Archipelago. The gibbon is distinguished by the slenderness of its form and by the extraordinary length of its arms, which, when the animal is standing, reach nearly to its ankles and which enable it to swing itself from tree to tree with wonderful agility. Its color is black, but its face is surrounded with a white or gray beard. Among the species are the common gibbon, or lar, the white-handed gibbon, the wow-wow and the hoolock. See APE.

Gibbon, EDWARD (1737-1794), an eminent English historian, born at Putney in Surrey. He entered Magdalen College, Oxford, but remained there only fourteen months. His studies resulted in his conversion to Roman Catholicism, and his father placed him under the care of a Calvinistic minister at Lausanne, by whom he was reconverted to the Protestant faith. During his years at Lausanne he studied diligently, and in 1758, after his return to England, appeared his first publication, *An Essay upon the Study of Literature*. In 1763 he visited Paris and Lausanne and in the following year traveled in Italy. It was here that the idea occurred to him, as he visited the ruins of the Capitol, of writing his great history, *The Decline*

Gibbons

and Fall of the Roman Empire. In 1774 he obtained a seat in Parliament and was a silent supporter of the North administration and its American policy for eight years. The first volume of his great history was published in 1776, and his reputation was established at once. A complete edition of the history was published in 1783. Gibbon's history shows not only the remarkable breadth of his knowledge and attainments, but a great power of organization. As an authority on the period from the reign of Trajan to the fall of Constantinople, Gibbon's work is still unassailed, although in his skeptical attitude toward Christianity he has not given due prominence to the work accomplished by its spread.

Gibbon, JOHN (1827-1896), an American soldier, born in Pennsylvania. In 1847 he graduated at West Point. He was for a time instructor there, and in 1861 he entered the Union army. He took part in the second Battle of Bull Run and in the battles of Antietam, Fredericksburg and Gettysburg and was twice wounded. In 1864 he was made major general of volunteers and in the following year brigadier general and then major general in the regular army.

Gibbons, JAMES (1834-), an American Roman Catholic cardinal, born in Baltimore,



CARDINAL GIBBONS

and educated in Ireland. His education for the priesthood was obtained in Saint Charles College and in Saint Mary's Seminary in Maryland, where in 1861 he was ordained priest. He

Gibeon

served as priest of Saint Patrick's Church, Baltimore, and in Saint Bridget's Church, Canton, near Baltimore. After acting as secretary to Archbishop Spalding, he was made chancellor of the archdiocese and later assistant chancellor of the plenary council which met in Baltimore. In 1868 he was made bishop of North Carolina and four years later of the see of Richmond. On the death of Archbishop Bailey, whose coadjutor he had been, Gibbons became head of the see of Baltimore, and thus he became the head of the Roman Catholic Church in North America. In 1886 Gibbons was created a cardinal by Leo XIII. He has written *The Faith of Our Fathers, Our Christian Heritage* and *The Ambassador of Christ*.

Gib'eon, one of the ancient cities of Palestine, first inhabited by the Hivites, who, at an early stage of Joshua's conquests, by disguising themselves in old clothes and professing to come from a far country, obtained an alliance and covenant with the Israelites. It was during a battle fought at Gibeon against the kings of the Amorites, that Joshua commanded the sun to stand still and the moon to stay, until the people had taken vengeance on their enemies (*Josh. x, 12-14*). The city was also connected with the history of David and Solomon. Gibeon has been identified with the modern El-Jib.

Gibraltar, *jib rawl'tur*, a town and strongly fortified rocky peninsula near the southern extremity of Spain, belonging to Great Britain. It is connected with the mainland by a low sandy isthmus, $1\frac{1}{2}$ miles long and $\frac{3}{4}$ of a mile broad, known as the "neutral ground," and it has Gibraltar Bay on the west and the open sea on the east and south. The highest point of the rock, which is of gray marble, is about 1400 feet above sea level; its north face is almost perpendicular, while its east side exhibits tremendous precipices. On its south side it is almost inaccessible, making approach from seaward impossible; the west side, although very rugged and precipitous, slopes toward the sea; and here the rock is protected by powerful batteries, rendering it apparently impregnable. Numerous caverns and galleries, extending 2 to 3 miles in length and of sufficient width for carriages, have been cut in the solid rock, with portholes at intervals of every 12 yards, bearing upon the neutral ground and the bay and mounted with more than 1000 guns of the largest size and finest pattern. The garrison numbers about 5000.

The town of Gibraltar is situated on the west side of the peninsula, terminating in Europa

Gibson

Point, and thus it fronts the bay. It consists chiefly of one spacious street, about a mile in length. The principal buildings are the governor's and lieutenant governor's houses, the admiralty building, a naval hospital, a victualling station, the barracks and a handsome theater.

Gibraltar is a free port and has a considerable shipping trade, being an entrepôt for the distribution of British manufactures. The chief export is wine. The administration is vested in the governor, who is also commander in chief of the troops. The civil population amounted to 19,120 in 1911, besides about 5000 soldiers.

Gibraltar, known to the Greeks as Calpe, was one of the famous "pillars of Hercules" (See HERCULES, PILLARS OF). It was first fortified as a strategic point by the Saracen leader, Tarik ibn Ziyad, in 711, from whom it was thenceforward called the "Rock of Tarik." It was ultimately captured by the Spaniards from the Moors in 1462, fortified in the European style and much strengthened. It was taken, however, in 1704 by a combined English and Dutch force, and was secured to Britain by the Peace of Utrecht in 1713. In 1779 a siege was begun by Spanish and French forces; it lasted till 1783, but failed.

Gibraltar, STRAIT OF, the channel which forms an entrance from the Atlantic into the Mediterranean. The narrowest part is a little to the west of Gibraltar, and is 15 miles wide.



A strong and constant current flows into the Mediterranean from the Atlantic Ocean, in the middle of the strait, but the under current, as well as two feeble lateral currents along the coast, set toward the ocean.

Gibson, CHARLES DANA (1867-), an American illustrator, born at Roxbury, Mass. He studied at the Art Students' League in New York and in 1886 began to draw for periodicals. He studied in Paris and also in London and Munich. His popular works are cartoons of

society. He created the type of feminine beauty known as the "Gibson girl." Among his published works are the *Education of Mr. Pipp*, *A Widow and Her Friends*, *The Social Ladder*, *London as Seen by C. D. Gibson* and *People of Dickens*.

Gibson, JOHN (1790-1866), one of the most distinguished English sculptors of modern times, born near Conway, in Wales. He attracted attention by a figure of *Time*, modeled in wax, which he exhibited at the age of eighteen. The patronage of William Roscoe assisted him to go to Rome, where he was cordially received by Canova and where he spent the rest of his life. On the death of Canova in 1822 Gibson entered the studio of Thorwaldsen and showed in all his works the influence of both these great sculptors. In 1836 he was made a member of the Royal Academy. Most of Gibson's subjects are taken from classical mythology and are executed with a noble severity and purity of style. Among his best works are *Venus with the Turtle*, considered by many his best work; *The Wounded Amazon*; *The Hunter and His Dog*; *Hylas and the Nymphs*; *Helen*; *Proserpine*; *Sappho*, and the group *Queen Victoria Leading Justice and Clemency*.

Gid'dings, JOSHUA REED (1795-1864), an American politician and reformer, especially famous as one of the moderate Abolitionists in the antislavery struggle. He was born at Tioga Point, Pa., but was taken in childhood to New York and then to Ohio. He served for a few months in the War of 1812, afterward taught school and in 1821 began the practice of law at Jefferson. He was elected to the legislature and to Congress and there early entered the struggle for the abolition of slavery in the territories. He soon attracted the attention of the country by his resolutions declaring that the slaves who had arisen and escaped from Virginia were guilty of no crime, since they were naturally entitled to their liberty. He was censured, and he resigned, but was immediately reelected, and he remained in Congress until 1859. Giddings powerfully opposed the Compromise of 1850, the repeal of the Missouri Compromise in 1854 and the Kansas-Nebraska Bill.

Gid'eon, the son of Joash, of the tribe of Manasseh. He delivered the Israelites from the oppression of the Midianites (*Judges VI and VII*). He was afterward chosen judge of Israel.

Gila, *he'lah*, a North American river which rises in the Sierra Madre Mountains in New Mexico and flows westward for about 500 miles

and then unites with the Colorado. Curious ruins of stone-built houses of a former age occur all along its banks.

Gila Monster, a name commonly given to a lizard found in the sandy deserts of New Mexico, Arizona and Texas. It is a repulsive animal, usually about a foot in length and often larger, with a fat tail and short, weak legs. Its scales are brilliant orange and jet black. It is closely allied to the heloderm, and, like the Mexican species, it is poisonous. It has grooved teeth and highly developed salivary glands at their bases. The bite of the gila monster is rapidly fatal to small mammals and birds and very injurious, though seldom fatal, to man. The heloderms are the only lizards known to be venomous.

Gilbert, HUMPHREY, Sir (1539-1583), an English navigator and explorer. He was a man of liberal education and attained distinction in the English army during several campaigns. He became interested in the search for a route to India and in 1578 received a commission from Queen Elizabeth to conduct an expedition. His first adventure met with mishap, but after a few years a second expedition, in which both Raleigh and Gilbert were interested and which was under Gilbert's personal command, sailed for America. He planted a colony near Saint Johns, Newfoundland, but it proved a failure, and after a few weeks Gilbert set out for England. He encountered a storm and was never heard from again.

Gilbert, JOHN, Sir (1817-1897), an English painter and engraver. His industry was wonderful and he produced an almost incredible number of works. In 1871 he was knighted. His first notable work was *The Arrest of Lord Hastings by the Protector Richard, Duke of Gloucester*, in water color. He also painted in oil, and among his more notable productions in that branch of the art are *Don Quixote Giving Advice to Sancho Panza*, *The Education of Gil Blas* and a series of tableaux of the principal characters in Shakespeare.

Gilbert, WILLIAM SCHWENK (1836-1911), an English dramatist, born in London. He studied at London University, became a clerk in the education office and in 1862 was called to the bar. His time was devoted, however, almost entirely to literature. After producing several plays which had a moderate success, he entered into partnership with Arthur Sullivan, the composer, and in conjunction with him produced a series of comic operas. *H. M. S. Pinafore*, *The*

Pirates of Penzance, *The Mikado* and other similar operas had a most remarkable popularity.

Gilbert Islands or **Kings'mill Group**, a group of sixteen islands in the Pacific Ocean, on the equator. They are of coral formation, and all are low and not fertile. Their chief products are cocoanuts, pandanus, taro and the bread-fruit tree. These islands were annexed by Great Britain in 1892.

Gilder, RICHARD WATSON (1844-1909), an American editor and poet, born in Bordentown, N. J. He was given a secondary education in his father's seminary at Flushing, Long Island, and studied law in Philadelphia. In an emergency campaign in Pennsylvania during the Civil War, he served as a private. He helped to establish the *Newark Register* and was afterwards editor of *Hours at Home*. When this publication was merged into *Scribner's Monthly*, he became the assistant editor; and when this magazine was in turn changed to the *Century*, he succeeded J. G. Holland as editor in chief. Mr. Gilder from the first took an active interest in matters of public welfare and became a member of several reform organizations. He wrote a number of poems for the magazines, and some of the best have been collected in *Five Books of Song*, *In Palestine* and *Poems and Inscriptions*.

Gilding, the art of covering a surface of metal, wood or paper with a fine layer of gold. It was practiced by the ancients, the Egyptians, Persians, Greeks and Romans having shown great skill in it. The ancient mechanical process, the best for many kinds of work, consists in applying a fine gold leaf to a surface which has been treated with a size, which, when partly dry, enables the gold to adhere. Japanner's gilding is performed by covering the surface with a gold dust or powder, instead of gold leaf. The frames of pictures and mirrors, moldings and other articles are gilded by the application of gold leaf, or by the inferior process of German gilding, that is, by tin foil or silver leaf with a yellow varnish above. Books are gilded by covering the edges with some substance to which the gold leaf will stick, and polishing the surface when dry. Metals are often gilded by means of an amalgam of gold and mercury, the mercury being driven off by means of heat after the application. The surface is then varnished. In the gilding of iron and steel, gold leaf is sometimes applied after the surface has been well cleaned and heated until it turns a bluish color. The process used in pottery, glass and china consists of applying the gold like paint, after which the articles are baked in an

oven of rather low temperature. After cooling, the gold is burnished. There are innumerable special processes for the gilding of particular kinds of ware.

Gilead, that portion of country extending from the Jordan eastward to the desert lands forming a portion of Arabia and included between Arnon on the south and Yarmuk on the north, though the boundaries are not very definitely determined. Most of the country is fertile, well watered and has a luxuriant vegetation. This is the land given the tribes of Gad, Reuben and a part of the tribe of Manasseh, when the Israelites took possession of the Promised Land (See *Numbers* XXI, 21). During all the history of the Israelites, Gilead was a sort of land of asylum, to which those who were not in harmony with the government could flee. It was the refuge for Absalom when he fled from his father, and during Absalom's rebellion it served David for a similar purpose. It was the home of Elijah and Saul, and Saul with his sons was buried there. See PALESTINE.

Giles, *jilez*, WILLIAM BRANCH (1762-1830), an American politician, born in Amelia County, Va., educated at Hampton-Sidney and Princeton colleges. He practiced law at Petersburg, Va., and was elected to Congress in 1791 as a Republican, though he had earlier held Federalist views. He became a leader of the most radical Republicans, attacked Washington's administration with great vigor, opposed the establishment of a national bank, opposed the Jay treaty, supported the Virginia Resolutions and made bitter charges against prominent Federalist officials. Elected to the Senate in 1804, he became a leader of the Republicans in that body. During the War of 1812, however, and in the years preceding, he opposed Madison's administration and constantly hampered the government in its management of the war. He retired from the Senate in 1815, almost discredited as a party leader.

Gill, CHARLES IGNACE (1844-1901), a distinguished Canadian jurist, born at Pierreville, Quebec. He was a member of the legislative assembly of the province (1871-1874) and of the Canadian House of Commons (1874-1879). In May, 1879, he was raised to the bench and was chosen to a position in the Dominion supreme court.

Gills, the breathing organs of animals which obtain their oxygen from water. In fishes, the gills consist of cartilaginous or bony arches, attached to the bones of the head and furnished on the outer, convex sides with a multitude of

fleshy leaves, of fringed, vascular fibers, resembling plumes, which are, when healthy, of a red color. The water is admitted by gill-openings, and as it circulates through the plume-like parts of the gills, the oxygen is extracted from it. The crustaceans, the mollusks and the amphibians in certain portions of their lives are furnished with gills.

Gilman, DANIEL COIT (1831-1908), a distinguished American educator, born at Norwich, Conn. He graduated from Yale University and was made professor of physical and political geography in that institution. He held the position until 1872, when he became president of the University of California. From 1875 until 1901 he served as president of Johns Hopkins University. On the establishment of the Carnegie Institution in the latter year Dr. Gilman was elected president, but he resigned his position after two years. Several of the most prominent universities have conferred degrees upon him. He was president of the American Oriental Society and a member of the British Association and of several other similar organizations of high rank.

Gilmore, PATRICK SARSFIELD (1829-1892), an American bandmaster, born near Dublin, Ireland. He went with an English band to Canada in 1847 and soon moved to the United States, becoming conductor of a military band at Salem, Mass. In 1859 he organized the famous Gilmore's Band at Boston, but during the Civil War served in the Union army as bandmaster. There he distinguished himself as a director of a great musical festival at New Orleans, in which many regimental bands participated. After the war, at the National Peace Jubilee in 1869 and the World's Peace Jubilee in 1872, he greatly extended his reputation, at one time conducting an orchestra of one thousand pieces and a chorus of twenty thousand voices. Soon afterward he began a concert tour through America, Canada, Great Britain and Continental Europe, by which he gained universal fame.

Gilolo, *je lo'lo*, **Jilolo** or **Hal'mahe'ra**, an island in the Indian Archipelago, the largest of the Moluccas. The area is estimated at 6300 square miles. It is of singular form, consisting of four peninsulas radiating north, east and south from a common center. The principal productions are sago, cocoanuts, spices, fruits, edible birds' nests and useful timber. Horses, cattle and sheep abound. The chief towns are Galela and Potani. The island is under the

control of the Netherlands. Population, about 120,000.

Gilt'head, a fish of the seabream family, common in the Mediterranean. It has strong grinding teeth, for crushing the shells of mollusks, on which it feeds. Its general color is a mixture of silver and sky-blue, its dorsal and caudal fins are black, while its sides are marked with golden bands, and between its eyes is a crescent-shaped yellow spot. It is a fine fish and sometimes reaches a weight of twenty pounds.

Gin, *jín*, a spirit which is distilled from grain and which is usually flavored with juniper berries, though sometimes with oil of turpentine and common salt and other substances. It is largely manufactured in Holland.

Ginger, *jín'jur*, a plant that grows in moist places in various parts of tropical Asia and the Asiatic islands and which has been introduced into the West Indies, South America and West Africa. It is a reed-like plant with white, purple-streaked flowers and knotty rootstocks. From these rootstocks is obtained the ginger of commerce. Besides having medicinal properties, ginger is a favorite condiment and confection.

Gingham, *ging'am*, a cotton fabric, differing from calico in having the colors woven with the fabric, not printed on it. The patterns are various—sometimes fancy designs, sometimes checkered and sometimes striped. Ginghams were first made in India, but now they are extensively manufactured in the United States.

Ginkgo, *jínk'go*, a plant cultivated for ornamental purposes in all civilized countries. It is a native of China and Japan, where it was considered as a sacred tree, but it was not until recently known in the wild state. It has wide, flat leaves on thin stems, and from the resemblance to the leaves of the maidenhair fern the ginkgo has often been called the maidenhair tree. It is found in the United States as far north as Massachusetts, and it is highly prized as an ornamental tree.

Ginseng, *jín'seng*, the root of a low plant, different species of which are natives of the United States and of China and which belong to the same family as the wild sarsaparilla. The Chinese prize ginseng highly, attribute to it superhuman virtues and consider it a remedy for nearly all diseases. Some of the roots, which resemble the human body in shape, command almost unlimited prices from the superstitious Chinese. Wherever found in the United States, ginseng is collected and becomes a valuable article of export. The result of this has been to

encourage its cultivation, and in many localities there are successful gardens of it; but as it takes about five years to mature a crop, the industry does not spread very rapidly.

Giordano, *for dah'no*, LUCA (1632-1705), an Italian painter, born at Naples. In 1679 he was employed by Charles II to ornament the Escorial, and at the court of Spain he became a great favorite. On his return to Naples, after the death of Charles II, he executed a great number of pictures with remarkable rapidity. His most celebrated pieces are frescoes in the Escorial at Madrid, and others at Florence and Rome. Some of his finest paintings are at Dresden.

Giorgione, *for jo'na*, (1477-1511), whose real name was Giorgio Barbarelli, was one of the most celebrated painters of the Venetian school. In Venice he ornamented the façades of several large buildings with frescoes, which have mostly perished. His portraits are reckoned among the finest of the Italian school. His pieces are rare, but some are to be seen at Milan and in the galleries at Vienna and Dresden. Among the works ascribed to him are *Moses and the Burning Bush*, *The Judgment of Solomon*, *Christ Bearing the Cross*, *Apollo and Daphne* and *Three Ages of Man*.

Giotto, *jot'to*, or **Ambrogio di Bondoni** (1266-1337), a celebrated Italian painter. He was born at the Florentine village of Vespignano. It is said that while a shepherd boy he was seen drawing sheep on a slate by Cimabue, who took him for a pupil. His natural talent developed so rapidly that he soon surpassed all his contemporaries. His figures have more life and freedom than those of Cimabue, as he particularly avoided the stiff style. Among his most celebrated pieces are the *Navicella* (ship) at Rome, frescoes representing the lives of Saint John the Evangelist and John the Baptist, found in the Cathedral of Santa Croce, Florence; also the history of Saint Francis, at Assisi, and several miniatures. He was also successful as a sculptor and architect. The Bell Tower of the Cathedral at Florence, commonly called Giotto's Tower, was Giotto's masterpiece, and though unfinished at the time of his death it is noted for its color and its profuse ornamentation.

Gipsy, *jip'sy*. See GYPSIES.

Giraffe, *ji raf'*, or **Camelopard**, a remarkable animal inhabiting Africa, the only species of its genus and family. It is the tallest of all animals, a full-grown male reaching the height of eighteen to twenty feet. This great stature

is mainly due to the extraordinary length of the neck, in which, however, there are but seven vertebrae. It has on its head two bony projections, resembling horns. Its great height makes

it easy for it to feed on the leaves of trees, and in this it is further aided by its tongue, which is long and can be thrust far out of its mouth and curled about the twigs and leaves. When it browses on grass, it stretches out its fore legs as wide as possible, till it can reach the ground by means of its long neck. Its color is usually light fawn, marked with darker spots. It is a mild and inoffensive animal, and in captivity it is very gentle and playful. The giraffe



GIRAFFE

was a native of a great part of Africa, but has been driven out of many regions by reckless hunters.

Girard, *je rahrd'*, STEPHEN (1750-1831), an American philanthropist and banker, born at Bordeaux, France. When but thirteen years old he became a sailor, and in 1773 he was already master and captain of a vessel operating between New York, New Orleans and the West Indies. In 1777 he began his mercantile career in Philadelphia. From 1780 to 1790 he was in the West India trade, in partnership with his brother John. When the yellow fever broke out in Philadelphia, he devoted his fortune to the care of the sick and the burial of the dead, and throughout his life he materially aided worthy charities. He was heavily interested in the first United States Bank, and upon the lapse of its charter he bought most of its stock and its building and instituted the Girard bank. During the War of 1812 he placed its resources at the disposal of the government. He was also a large stockholder in the second United States Bank. At his death his immense fortune was left to charitable and municipal institutions of Philadelphia and New Orleans. Girard provided in his will for the establishment of Girard College. See GIRARD COLLEGE.

Girard College, a college established in Philadelphia, in 1848, under provisions made in the will of Stephen Girard. It was originally instituted for the education of poor white orphan boys. The faculty contains about seventy instructors and professors, and there are about 1750 students. The library contains 17,000 volumes; the endowment funds amount to nearly 16,000,000, and the property valuation of the institution is about the same. A peculiar provision of the will prevents any ecclesiastic, missionary or minister from having connection with the college, and clergymen are not even allowed to enter the grounds.

Girder, a main beam, either of wood or iron, resting upon a wall or pier at each end, employed for supporting a superstructure or a weight, as a floor, the upper wall of a house when the lower part is sustained by pillars, or the roadway of a bridge. Wooden girders are sometimes cut in two longitudinally, an iron plate is inserted between the pieces and the whole is bolted together; such a girder is called a *sandwich girder*. For bridges, cast-iron girders are sometimes used, in lengths of 40 feet and upward, but when the span to be crossed is much greater than 40 feet, recourse is had to wrought iron, or to *trussed, lattice or box girders*, and cast iron is now little used. A *trussed girder* is a wooden girder strengthened with iron. A *lattice girder* is a girder consisting of two horizontal beams, united by diagonal crossing bars, somewhat resembling wooden lattice work. A *box girder* is a kind of girder resembling a large box, such as those employed in tubular bridges. Another style is the *bowstring girder*, which is a variety of the lattice girder; it consists of an arched beam, a horizontal tie resisting tension and holding together the ends of the arched rib, a series of vertical suspending bars, by which the platform is hung from the arched rib, and a series of diagonal braces between the suspending bars.

Girondists, *zhe roN'dists* (from *Gironde*, a department of France), one of the great political parties of the French Revolution. The Girondists were moderate republicans, but were distinguished for visionary ideals, rather than for a well-defined policy; hence, they fell an easy prey to the more radical Jacobins. Their overthrow was accomplished in June, 1793.

Glacial, *gla'shal*, **Pe'riod or Age of Ice**, the division of geologic time embracing the first part of the Quaternary period and taking its name from the peculiar climatic conditions

that prevailed on the northern hemisphere. During the Glacial period many parts of the old and the new world were subjected to intense cold and covered with a sheet of ice, which is supposed in many places to have been several thousand feet in thickness. In the United States this ice sheet covered the whole of New England, New York, northern New Jersey, Pennsylvania and Central Ohio and extended westward beyond the Mississippi into Minnesota. It is not known whether this vast region was covered by one sheet of ice or by several which in time flowed together. Nearly all of Canada east of the Rocky Mountains was also covered in a similar manner, and in Europe the British Isles and all of the Continent north of the forty-ninth parallel were covered with ice.

In the course of time the glacier began to move towards its lowest point. In the eastern part of the United States its general direction was to the southeast, while in the central portion it was to the southeast and southwest, showing a division in the ice sheet. In Canada the direction seems to have been toward the northeast. Wherever it existed the straight mass of ice in its movement leveled hills and mountains, filled up valleys and lake beds in some places and hollowed them out in others. The rocks over which it passed were worn smooth and were scratched by the movement of the boulders which were frozen into the glacier. The scratches thus made are known as *striae*. Some of these are large furrows, while others are mere scratches on the rock. The glacier carried with it large quantities of rock and other debris, which were deposited wherever it melted. This accounts for many of the boulders in the Mississippi valley and in the eastern portion of the United States, which are of an entirely different character from the rock of the surrounding region. See ERRATICS.

The cause of the Glacial period is not well understood, and various theories have been advanced to account for it. Among these are that the sudden elevation of the northern continents caused such a change in temperature as to cover the region with the ice; another is that the change in atmospheric and oceanic currents caused such a heavy rainfall over the cold portions of these continents as to form the glacier, and a still later theory is that the change in climate was due to a change in the relative positions of the earth and sun. See DRIFT; GLACIERS; MORAINES; QUATERNARY PERIOD.

Glacier National Park, a government res-



SELKIRK GLACIER
In the Rocky Mountains, British Columbia

Glaciers

ervation, created a national park in February, 1910. It is in northwestern Montana, 447 miles by rail from Yellowstone Park, and has an area of about 1500 square miles. As the name implies, the most striking feature of the park is its glaciers, of which there are between seventy and eighty, the largest nearly five square miles in extent. Other scenic beauties are plentiful, also, for there are steep cliffs, dashing mountain streams, dozens of waterfalls, and over 250 lakes, surrounded by wooded mountains or rocky walls. The streams, the lakes, and Flat-head River, which borders the park on the west, abound in fish, and the wooded sections contain many wild animals. Numerous trips, of from one day to thirty, have been mapped out, and the park is becoming a favorite resort of tourists during the open season, from June 15 to October first.

Glaciers, *glashurz*, icy masses of great bulk, harder than snow, yet not exactly like common ice, which cover the summits and sides of mountains above the snow line. They are found in Switzerland, Scandinavia, the Andes and in the Rocky Mountains in British Columbia and Alaska. They extend down into the valleys often far below the snow line and bear a considerable resemblance to a frozen torrent. Glaciers have their origin in the higher valleys, where they are formed by the freezing and compression of masses of snow into a granular ice, called by the French *neve*. The ice of glaciers differs from that produced by the freezing of still water and is composed of thin layers filled with air bubbles. It is likewise more brittle and less transparent.

The glaciers are continually moving downward, and not infrequently they reach the borders of cultivation. A glacier moves from eighteen to twenty-four inches in twenty-four hours. At its lower end the glacier is generally very steep and inaccessible. In its middle course it resembles a frozen stream, with an undulating surface, broken up by fissures, or *crevasses*. As it descends, it experiences a gradual diminution, from the action of the sun and rain and from the heat of the earth; hence a phenomenon universally attendant on glaciers—the issue of a stream of ice-cold turbid water from the lower end. The descent of glaciers is shown by changes in the position of masses of rock at their sides and on their surface.

As glaciers move they pile up *moraines*, consisting of accumulations of stones and gravel, along their sides and at their lower ends. These

Glaciers

are composed of fragments of rock detached by the action of frost and other causes (See *MORaine*). The fissures or crevasses by which glaciers are traversed are sometimes more than 100 feet in depth, and since they are often covered with snow, they are exceedingly dangerous to travelers. One of the most famous glaciers of the Alps is the Mer de Glace, belonging to Mont Blanc, in the valley of Chamouni, about 5700 feet above the level of the sea. However, in the chain of Monte Rosa the phenomena of glaciers are exhibited in their greatest sublimity, as also in their most interesting phases from a scientific point of view. Glaciers exist in all zones in which mountains rise above the snow-line. Those of Norway are well known and also those of Iceland and Spitzbergen. Hooker and other travelers have given accounts of those of the Himalayas. Glaciers are conspicuous on the Andes, while the Southern Alps of New Zealand rival in this respect the Alpine regions of Switzerland.

The glaciers of Alaska are noted for their size and grandeur. They reach their greatest development along Glacier Bay and around Mount Fairweather, where, excepting those of polar regions, the largest glaciers of the world are found. Compared with these the glaciers of the Alps are mere rivulets. Among the most noted are the Malispena, on Yakutat Bay, 1550 feet high, with an area of 600 square miles; the Valdez, in Prince William's Sound, fifteen miles long; the Muir, at the head of Glacier Bay, 200 feet high with a frontage three miles long and the Pacific Glacier, off Mount Fairweather. Extensive glaciers are also found around Cook's Inlet and along the Peninsula of Alaska. All of the valleys of the northern Alaskan coast are filled with ice rivers, and the fiords of this entire region have been formed by glacial action. In numerous instances the glaciers have plowed out gorges many feet below the level of the sea.

The problem of the descent of glaciers is of extraordinary interest, and various theories have been put forward to account for it. It was shown that a glacier moves very much like a river—the middle and upper parts faster than the sides and the bottom—and that glacier motion was like that of a mass of thick mortar or a quantity of pitch down an inclined trough. This theory is known as the *viscous theory* of glaciers, which presupposes that ice is a plastic body; and this plasticity has been satisfactorily explained by Prof. James Thomson, of Glasgow

Glacier Tables

by the phenomenon of the melting and refreezing of ice. Water, he discovered, when subjected to pressure, freezes at a lower temperature than when the pressure is removed. Consequently, when ice is subjected to pressure it melts; if it is relieved of pressure the water again solidifies. Therefore if two pieces of ice are pressed together, they tend to relieve themselves by melting at their points of contact, and the water thus produced immediately solidifies on its escape. If ice is strained in any way it similarly relieves itself at the strained parts, and a similar regelation follows. This, when applied to the glaciers, gives a complete explanation of their plasticity. Pressed downward by the vast mass, the ice gradually yields. Melting and refreezing takes place at some parts; at others the gradual yielding at strained points goes on. In the latter process there is no visible melting, but there is the gradual yielding from point to point to the pressure above. If, however, at certain points the strain is intense, the ice becomes extremely brittle. The latter fact disposes of Tyndall's objection to Forbes's theory, which was based on the fact that *crevasses* proved the brittleness and not the viscosity of ice.

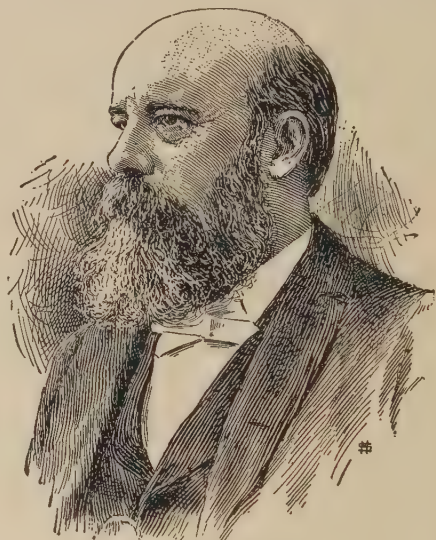
See GLACIAL PERIOD; MER DE GLACE; MUIR GLACIER. Consult Russell's *Glaciers of North America*, and Tyndall's *Glaciers of the Alps*.

Glacier Tables, large stones found on glaciers, supported on pedestals of ice. The stones attain this peculiar position through the melting away of the ice around them and through the depression of its general surface by the action of the sun and rain. The block, like an umbrella, protects the ice below it from both; and accordingly its elevation measures the level of the glacier at a former period. By and by the stone table becomes too heavy for the column of ice on which it rests, or its equilibrium becomes unstable, whereupon it topples over, and, falling on the surface of the glacier, it covers a new space of ice and begins to form another table. See GLACIERS.

Gladden, WASHINGTON (1836-), an American clergyman and author, born in Potts Grove, Pa., and educated at Williams College. He began his career as a Congregational minister in 1860 and served as pastor of a number of leading churches in Brooklyn, N. Y., North Adams, Mass., and Springfield, Mass. In 1882 he became pastor of the First Congregational Church of Columbus, Ohio. From 1871 to

Gladiators

1875 he was one of the editors of the *Independent* and was editor of the *Sunday Afternoon* from 1878 to 1880. His writings and pulpit utterances are known for their vigor, directness and practical suggestions and have exerted a wide influence not only within his own church but throughout the country. Mr. Gladden is the author of many works. Chief among these



WASHINGTON GLADDEN .

are *Plain Thoughts on the Art of Living*, *Workingmen and Their Employers*, *Being a Christian*, *The Young Men and the Churches*, *Parish Problems*, *Burning Questions*, *Ruling Ideas of the Present Age* and *The Christian Pastor*. He has also written extensively for magazines.

Gladiators, combatants who fought at the public games in Rome for the entertainment of the spectators. The first instance known of gladiators being exhibited was in 264 B. C., by Marcus and Decimus Brutus at the funeral of their father. Gladiators were at first prisoners, slaves or condemned criminals; but afterward freemen fought in the arena, either for hire or from choice; and still later, men of senatorial rank, and even women, fought. The regular gladiators were instructed in schools, and the overseer purchased the gladiators and maintained them. Men of position sometimes kept gladiatorial schools of their own. The gladiators fought in the schools with wooden swords. In the public exhibitions, if a vanquished gladiator was not killed in the combat, his fate was decided by the people. If they

Gladiolus

wished his death, perhaps because he had not shown sufficient skill or bravery, they held up their thumbs; the opposite motion was the signal to save him. The victor received a branch of palm or a garland and sometimes his freedom.

Gladiolus, a genus of plants of the iris family, containing about ninety species, natives of Europe and Africa, but especially numerous in South Africa. The gladioli are extensively grown in Europe and the United States, both indoors and out, because of the large, brilliant flowers, varying from white to rose and crimson in color. They are arranged in long, one-sided clusters, which are raised on a tall stem from among long, sword-shaped leaves.

Gladstone, WILLIAM EWART (1809–1898), a British statesman, born at Liverpool. He was educated at Eton and at Christ Church, Oxford, and left college in 1831. In 1832 the first Reform Act was passed, and Gladstone's public career commenced by his being returned



WILLIAM E. GLADSTONE

for Newark. When Peel assumed office in 1834 Gladstone accepted the post of junior lord of the treasury, and in 1841 he became, under Peel, vice-president of the board of trade and master of the mint. Two years later he became president of the board of trade and showed in

Gladstone

this position the high financial ability for which he later became so famous. He took part with Peel in the repeal of the Corn Laws, a course which cost him his seat for Newark, but in 1847 he was returned for Oxford University. His ability as a financier grew, and it was in his attack on Disraeli's budget of 1852 that his first really great speech was made. In the following year he became chancellor of the exchequer under the earl of Aberdeen, a post which he also held for a short time in 1855 under Lord Palmerston. In 1859 he again took office as chancellor of the exchequer under Lord Palmerston. The budgets which he brought forward during the six years that followed were remarkable documents. At the general election of 1865 he was returned for South Lancashire, and in the same year he became the Liberal leader in the Commons in the Russell administration, still continuing to hold the chancellorship of the exchequer. In 1867 a Reform Bill was brought forward, to the final shape of which Gladstone materially contributed. His advocacy of this measure shows his definite break with the Conservative party and his transition to the Liberals.

At the general election of 1868 Gladstone lost his seat for South Lancashire, but was returned by Greenwich. There being a great Liberal



GLADIOLUS

majority in the new Parliament, Gladstone became premier. Next year he carried his bill for the disestablishment of the Irish Church, and in 1870 he passed his Irish Land Act. Parliament was dissolved in 1874, and the Conservatives succeeded to office. During Lord Beaconsfield's tenure of office, Gladstone de-

nounced the Bulgarian atrocities, the Anglo-Turkish treaty and the Afghan War, and his speeches during his candidature for Midlothian greatly helped to render the government unpopular. In 1880 the general election reinstated him firmly in power. In 1882 a Prevention of Crimes and an Arrears Act for Ireland were passed, and in 1883 measures relating to bankruptcy were carried. The bill extending household suffrage to the counties was next carried, but the Gladstone ministry fell the following year. In 1885 Salisbury resigned after an adverse vote in the Commons, and Gladstone again came into power. He soon startled the country by introducing a measure of home rule for Ireland (1886). It failed to pass the Commons, and an appeal was made to the country, the result of which was emphatically adverse to Gladstone's proposals. He had to make way for Lord Salisbury. In 1892, however, the result was again reversed, and Gladstone once more resumed authority. He introduced another Home Rule bill, which was passed by the House of Commons, but rejected by the House of Lords. After this Mr. Gladstone retired from public life. He wrote several books, among which are *Gleanings from Past Years* and *Studies on Homer and the Homeric Age*.

Glanders, a contagious disease afflicting horses, mules and asses and sometimes other domestic animals, though cattle, sheep and pigs are usually free from it. The disease is caused by a microbe and appears in different forms, though all animals afflicted with it usually present about the same characteristics. It is usually fatal, the animal dying in from eight days to three weeks. The chronic form, generally known as *farcy*, begins with the formation of little bunches or nodules under the skin, which terminate in ulcers. These ulcers occur usually on the neck and shoulders and inside the thighs. The disease affects the lungs and causes the nostrils to discharge a very offensive pus.

The spread of glanders is usually due to infection from the pus and other discharges of the afflicted animal. No remedy has been discovered, and when the disease appears the only means of preventing its spread is to kill the diseased animal and bury or burn the carcass, then thoroughly disinfect the stables and all articles that have come in contact with the animal. Men have been known to acquire the disease by working over animals afflicted with it, and the symptoms are similar to those in the horse.

Glands, organs whose specific function is to separate something from the blood (See SECRETION). In structure a gland is a body of secreting cells, a supporting basement membrane, a fine network of blood vessels, a nerve supply and a duct through which the secretion passes. *Simple tubular glands* are depressions of the mucous membrane, lined with secreting cells, as the glands of the stomach. Some bodies called glands have no duct, as the spleen and the thymus gland; the latter is situated in the front of the chest behind the sternum and partly in the lower part of the neck. It is largest in infants and gradually disappears in adult, or old, persons. It has been claimed that its function is the formation of colorless corpuscles. In hibernating animals it becomes enlarged and is laden with fat, as the time for the winter sleep approaches, and it may help to maintain the temperature and respiration of the body during the period of rest. The *thymus* of veal and lamb is called *neck sweetbread*, to distinguish it from the pancreas, or stomach sweetbread. The *thyroid gland* lies in the throat below the larynx and when enlarged by disease gives rise to "Derbyshire neck" (See GOITER). The *liver* is the largest gland of the body. In connection with the alimentary canal there are in the mouth, the two *parotid*, two *submaxillary*, two *sublingual* and many *buccal* glands, whose function is to secrete saliva. The parotids are situated one in front of each ear and are the seat of the disease known as *mumps*. *Sebaceous glands* are abundant in those parts of the surface of the body supplied with hair; they are also situated about the entrances to the body, the nose, mouth and ear. These glands are absent from the palms of the hand and soles of the feet, and pour out an oily secretion which keeps the hair and skin soft. *Sudoriferous*, or sweat, glands are situated in all parts of the surface of the body and are especially abundant in the palms of the hand and soles of the feet. See SKIN; LIVER; PANCREAS; SPLEEN.

Glas'gow, the largest city in Scotland and the second largest in Great Britain, is situated mainly in the County of Lanark, on both banks of the Clyde River. The southern portion is built on low-lying, level ground, the northern portion on a series of elevations of varying heights. The streets are in general wide and straight, and the houses are built almost wholly of freestone. As a whole, Glasgow is now excelled by few cities in the United Kingdom in architectural beauty and attractiveness of appear-

ance. Of the older buildings the cathedral, situated in the northeast of the city, is the most noteworthy. It is supposed to have been begun about 1240 and is a large Gothic edifice, with tower and spire rising from the center, and is especially noted for its beautiful crypt. The new university buildings, in the west end of the city, cover about 4 acres of ground on a splendid site, and their value is over \$2,000,000. Connected with the university is the Hunterian Museum of Anatomy and Natural History. The municipal buildings, in the center of the city, in George Square, form an imposing structure in the Renaissance style. Other noteworthy buildings are the Free Church College, the Royal Exchange, the Stock Exchange, the postoffice, the Saint Enoch Station and Central Station hotels, several clubhouses, banks and insurance offices. Most of the public monuments are collected in George Square, the finest square in the city. Glasgow has several public parks, the largest, the Green, containing 140 acres. The principal libraries are the University Library and the Mitchell Free Library. Among educational institutions, after the university, are Anderson's College Medical School, Saint Mungo's College, the Glasgow and West of Scotland Technical College and Saint Margaret's College for women.

The industries embrace cotton, linen, silk, woolen and jute, in all the processes of manufacture and printing; the making of steel, and machinery and metal goods of all descriptions; shipbuilding, over 400,000 tons of shipping having been launched in some single years on the Clyde; extensive chemical works, potteries, glass works, brick works, breweries, distilleries, tanneries, tobacco works and sugar refineries. The commerce is more than commensurate with the manufactures, the total number of vessels entering and leaving the harbor in 1910 being 11,000, with a tonnage of 7,000,000.

Glasgow has taken an especially advanced position upon the subject of municipal activities and owns and operates an exceptionally complete and perfect sewage disposal plant, lodging houses, tenements, public baths and wash rooms, lighting plants, waterworks, street cars, markets and slaughterhouses and ferries. The city is successful in all these lines and gains a net profit on the investments.

The city was founded about 560 and was erected into a royal burgh in 1180. Glasgow is represented in Parliament by seven members. Local government is in the hands of a lord provost,

ten bailies and a council of 48 members. Population in 1901, 760,423; in 1911, with changed boundaries, 784,496.

Glasgow, UNIVERSITY OF, one of the most celebrated universities of Great Britain, founded at Glasgow in 1451. By acts of Parliament in 1858 and 1889, the university was thoroughly reorganized and now exists on very much the same plan as the universities of Oxford and Cambridge. The corporation consists of a chancellor and rector, dean of faculties, principal, professors and students. The chancellor is chosen for life. The rector is chosen by the students every three years. The university maintains departments in the arts, science, medicine and surgery, theology and law. The enrollment is about 2300, including many who receive fellowships and scholarships. The library contains 210,000 volumes, and the university has connected with it a number of important museums and exhibits.

Glass, a hard, brittle substance made by melting together under intense heat, sand and either potash, soda, lime or oxide of lead. When the substances from which it is made are pure, glass is usually transparent.

HISTORY. Glass has been in use for so many centuries that we do not know when it was first manufactured. Tombs of the ancient Egyptians which were built more than 3000 years B. C. show glassblowers at work, and specimens of glass that were made more than 2000 B.C. have been found in other tombs of these ancient people. The Chinese and other peoples of the East also became very skilful in the manufacture of glass before the Christian era. Vases, pitchers and other ornamental vessels found among the ruins of the buried cities in Greece and in Asia Minor, show that the Greeks and other ancient peoples of this part of the world were well acquainted with the manufacture of glass. The earliest use of glass was for ornamental purposes, and all of the articles which have been discovered in the ruins of ancient cities are of colored glass. The use of glass for windows is of more recent origin. As far as known, it was first used for this purpose in England in the latter part of the seventh century, but its use was restricted to colored glass which appeared in cathedral windows.

The manufacture of glass was introduced into the United States at an early date, but it did not become successful until after the Revolutionary War. The leading countries in the manufacture of glass now are Austria-Hungary, England, France and the United States. In this country

the center of the industry is around Pittsburg, Pa., and in the natural gas and coal regions of Indiana, Illinois and some other states.

KINDS OF GLASS. Owing to the different substances used in its manufacture, the various proportions in which these may be combined, and the different methods of manufacture, there are many different varieties of glass.

Colored Glass. However strange it may seem to us, the glass made by the ancients was colored. Originally this coloring was probably due to the impurity of the materials used. Later it was discovered that different colors could be produced by mixing certain substances with those ordinarily used in the manufacture of glass, and all colored glass made at the present time is produced in this way, the oxides of metals being used for most of the colors. Chloride of silver and gold produce yellow; compounds of iron, copper and gold produce red; blue is produced by cobalt, and orange by peroxide of iron and chloride of silver, while the oxide of tin gives a white color. By mingling these coloring matters in various proportions, a great variety of tints can be produced.

Ornamental Ware. There are many methods of making ornamental glassware. Sometimes the glass is colored by dipping a transparent glass into colored glass when the latter is in a molten state. Figures worked into vases and other articles, as shown in Figs. 6, 7, 10 and 11 in the accompanying color plate, are usually made by working the colored glass into the glass forming the body of the object. This is usually done by placing the figures upon the outside of the vessel and then subjecting the glass to such heat as will partially fuse it. The figure then sinks into the body of the glass and blends with it. Other beautiful effects, such as are shown in Figs. 4 and 9, are produced by blending glasses of different colors, either in the manufacture of the article or in the material from which it is to be made. For the method of making colored glass windows, see article on STAINED GLASS.

Crown Glass is the English window glass and differs from that made in the United States by being blown into spheres, instead of cylinders. When these are flattened they make circular plates. Crown glass is considered by some persons to be of better quality than cylinder glass, but it is not so desirable for windows, because it is of uneven thickness. Bottles and most small articles are made by blowing the glass into molds (See BOTTLE). Bottles and fruit cans are also made by machinery.

Pressed Glass. Much of the table ware and

many other small articles are made by pressing the glass in molds. The mold is of iron or steel and contains any ornamental designs which the article is to take. A sufficient quantity of melted glass to make the article is dropped into the mold, and then a plunger, which forms the inside of the article, is forced down upon it. This presses the glass into every part of the mold and impresses upon it the desired design.

Plate Glass. Plate glass is made by casting on an iron table. The melted glass is poured onto the table, which has a steel rim rising above the surface to the height of the desired thickness of the glass. As the melted glass is poured, a heavy roller is passed over it, forming the plate. The peculiar softness and brilliancy of plate glass are due to the purity of the material used and the polishing which the glass receives.

Flint Glass. This is a variety in which potash and pure sand are used, making it particularly clear and transparent. It is used for the best articles of table ware and in the manufacture of small bottles, vases and other smaller articles.

Cut Glass. This is made by grinding the best quality of blown glass on wheels, over which flow streams of water and sand. This glass is prized for its brilliancy and is very expensive.

MANUFACTURE. Glass is made in factories especially constructed for the purpose. The most important part of the factory is the furnace. This may be circular, with a shelf running around next to the wall, or it may be rectangular, with the bottom sloping towards one end. In either case, the furnace is the base of a huge chimney. The fuel used is gas, and the furnace must be supplied with a strong draft, in order to insure the intense heat necessary to melt the materials. These are placed in pots, when circular furnaces are used, and the pots rest upon the shelf around the wall of the furnace. These pots are made of fire clay and are very carefully constructed. Each holds from 1500 to 2000 pounds of material. For the best quality of glass the pot is hooded and has an opening on the side of the hood, through which the material can be put in and the melted glass taken out. For cheaper varieties the pots are open at the top. In the tank furnace the material is thrown into the tank, where, as fast as it melts, it runs down the sloping bottom to the lower end of the tank, from which it is taken out, while the raw material is put in at the opposite end.

The kind and quality of glass depend upon the substances used. For a good quality, all of the raw material must be pure. Sand forms the basis of all varieties and is the most difficult substance



ARTISTIC GLASSWARE

1. Modern Vases, London.
2. Phoenician Pitcher, ancient.
3. Goldglass Tumbler, eighteenth century.
4. Modern Vases, Berlin.
5. Ruby Pitcher.
6. Chinese Vase.
7. Mohammedan Lamp, Egypt, fourteenth century.
8. Spanish Glass.
9. Venetian Flask.
10. Persian Bowl.
11. Modern Vases, New York.

from which to separate the impurities. Animal and vegetable impurities are removed by burning, but mineral impurities cannot be separated. Iron is the most objectionable of these, since it discolors the glass and, except for the poorest qualities, makes the sand worthless. Most sand is obtained from banks, but that for the highest grade of glass is prepared by crushing pure quartz rock. The other materials determine the kind of glass. Lime makes a hard, brilliant glass, but too much of it makes the glass brittle. Potash makes a clear, transparent glass, while soda imparts the green tint usually seen in cheap bottles. Oxide of lead imparts a brilliant luster to glass and also makes it soft. Window glass is usually made of sand, lime and potash or soda, and plate glass of sand, soda and lime.

Preparation of Material. The ingredients are ground to a fine powder and thoroughly mixed in proper proportions, forming what is called the *batch*. To this a small quantity of broken glass, or *cullet*, is added to assist in melting. In pot furnaces it requires about twenty-four hours for the glass to melt and become clear. When this has been done the fire is lowered, and the glass is taken out and worked. In tank furnaces the material is constantly being added and the glass being withdrawn.

Methods Used. There are three general methods of shaping glass, blowing, pressing and casting. Bottles, window glass, vases and the most expensive tableware are blown. The glass blower uses only a few tools of the simplest patterns and depends almost entirely upon his skill to obtain the desired results. He gathers on the end of his blowpipe, which is a straight iron pipe about four feet long, a sufficient quantity of melted glass to make the article desired, then by blowing into this, rolling and swinging the pipe and using such tools as calipers and burnishers, he proceeds to fashion the object. In blowing window glass, the workmen stand upon a bridge over a trench, which is several feet deep, and they use larger and longer blowpipes than those used in making small articles. The workman gathers upon his blowpipe from twenty to twenty-five pounds of glass. By blowing into this and swinging his pipe, he causes this mass at first to take on a shape resembling a pear; then by holding his pipe upright and blowing into the glass and rotating the pipe, he changes the pear into the form of a cylinder. When the cylinder has been perfected its ends are cut off; it is then laid upon a table and scratched lengthwise with a diamond; it is then

cut in two on the side by laying a cold iron over the mark. The open cylinder is placed in the flattening furnace, where, as it softens, a workman flattens it by pressing it down upon a table with a piece of charred wood attached to a long handle. This makes a pane of glass about forty-five inches long and thirty-six inches wide.

Glass Snake. See BLINDWORM.

Glas'tonbury, a town and municipal borough in Somerset, England, situated 25 mi. s. w. of Bath, on a peninsula formed in the Brue River. Though it has some manufactures and a considerable trade, it is chiefly important as the scene of many interesting events of English history. It contains the remains of a beautiful abbey, which was founded in the sixth century and which once covered more than 60 acres. It is said that the first Christian church in England was erected at Glastonbury. Tradition states that it is the burial place of King Arthur and Queen Guinevere, and that it was here that Joseph, one of the early Christian apostles to England, planted his pilgrim's staff, which took root and produced the famous Glastonbury thorn, which, it is said, blossomed every Christmas day. In medieval history and modern history Glastonbury had less importance, though in the time of Henry VIII it was the scene of violent persecutions on the part of the English Church. Population in 1911, 4300.

Glauber's, *glow'burz*, **Salt**, sulphate of sodium, so called because of the importance attached to its chemical and medicinal properties by Glauber, its discoverer. It forms large colorless prisms, which turn to powder on exposure to the air. It is soluble in water, and when heated it melts in its water of crystallization. It is found in many localities, both dissolved in the water of mineral springs and of salt lakes and as a powder around them. The chief medicinal use of Glauber's salt is as a purgative, but it is only used by veterinarians.

Glazing. See POTTERY.

Glen'coe, a romantic Scottish valley in the County of Argyle, near the head of Loch Etive. It is bounded on both sides by almost perpendicular mountains more than 3000 feet high, and the scenery is wild and grand. The valley was the scene of a tragedy, known as the Massacre of Glencoe, in February, 1692. The Highlanders who had favored James II were promised a full pardon if they would submit to the rule of William and Mary. The surrender of the MacDonalds was delayed, and their enemies, taking advantage of an irregularity in the form of their

submission, secured a warrant from the king to destroy them. Accordingly, after enjoying their hospitality, one hundred twenty men, led by Captain Campbell, attacked the Macdonalds and slew about sixty men, women and children.

Glendower, *glent' door*, OWEN (1359 ?-1416 ?), a distinguished figure in Welsh history, the leader in the revolt against Henry IV of England. He had been a follower of Henry of Lancaster before his accession to the throne as Henry IV, but for personal reasons he turned against him later, and the Welsh, who had been devoted to Richard II, were very ready to follow his example. Having raised a considerable force, Glendower caused himself to be proclaimed prince of Wales in 1400. He defeated the king's troops and, retiring to the mountains, successfully resisted for a time all attempts to bring him to action. His fortunes waned after several years, and from 1416 nothing is heard of him.

Glens Falls, N. Y., a village in Warren co., 56 mi. n. of Troy, on the Hudson River and on the Delaware & Hudson railroad. The falls in the river supply power for the factories, the most important of which are lime and cement works, lumber mills and manufactories of paper, shirts, collars and other goods. The village has a public library, a hospital, a state armory, two academies and several parks. Glens Falls was settled in 1763. Population in 1910, 15,243.

Glenwood, Iowa, the county-seat of Mills co., twenty miles s. e. of Council Bluffs, on the Chicago, Burlington and Quincy railroad. It is in a fine corn, fruit-growing and live stock country. It is the seat of the state institution for feeble-minded children. Population in 1910, 4052.

Globe, a sphere (See SPHERE). In geography and astronomy, the term globe is applied specifically to an artificial sphere, made of metal, plaster, paper or pasteboard, on the surface of which is drawn a map, or representation of either the earth or the heavens, the former being called the *terrestrial globe*, and the latter, the *celestial globe*. In the terrestrial globe the wire on which it turns represents the earth's axis, the extremities of it representing the poles. On the surface of the globe, as on other maps, are marked parallels of latitude and meridians. When the meridians are drawn through every 15° of the equator they are sometimes called the *hour circles*, since each two meridians mark points differing by one hour in time.

Glom'men, the largest river in Norway. It issues from Lake Aursundsjo, about 2417 feet above the sea level, in the southeast of South

Trondhjem, flows generally south and after a course of about 370 miles falls into the Skagerrak at Frederikstadt. It has several falls in its course which impede navigation.

Gloucester, *glos'tur*, a port and city, the capital of Gloucestershire, England, situated on the left bank of the Severn, 33 mi. n. e. of Bristol. The ancient Roman ground plan of the city is still seen in the four streets meeting at right angles in the center of the town, at what is called *the cross*. Remains of Roman walls are to be seen in many places. Among the buildings of interest are a deanery, the New Inn, the episcopal palace and the new guild hall. The nunnery, which existed as early as the seventh century, was supplanted by a monastery about 820, which was in turn followed by a great Benedictine Abbey. This abbey became the center for the cathedral, which was built from 1088 to 1498. Gloucester has engineering works, flour mills, iron foundries, shipbuilding yards and manufactories of chemicals, cutlery, agricultural implements and soap. The commerce is important. Population in 1911, 50,035.

Gloucester, MASS., a city of Essex co., 31 mi. n. e. of Boston, on the Boston & Maine railroad. There is an excellent harbor, and the fisheries, which are the largest in the United States, include cod, herring, haddock, halibut and mackerel. There are also shipbuilding yards, quarries of granite and manufactories of clothing, shoes and cigars. The first permanent settlement was made in 1633, and it was chartered as a town in 1642 and as a city in 1873. The importance of the town dates from the beginning of the eighteenth century. It was prominent during the Revolution and the War of 1812, numerous privateering vessels being equipped and sent out from here. Population in 1910, 24,398.

Gloucester City, N. J., a city in Camden co., on the Delaware River, opposite Philadelphia, and on the Atlantic City and the West Jersey & Seashore railroads. It has manufactories of gas burners, gingham, calico, yarn, shoes and other articles. Population in 1910, 9462.

Glove, *gluv*, a covering for the hand or for the hand and wrist, with a separate sheath for each finger. Gloves are made of leather, fur, cloth, silk, linen thread, cotton and worsted. The chief leathers used in glove manufacture are buck, calfskin and sheepskin, for military gloves; lambskin, for most of the so-called kid gloves; true kid, for the best and finest gloves; dog, rat and kangaroo skins, for other grades. The

leather in all cases undergoes a much lighter dressing than when used for boots and shoes. Leather gloves are usually cut out by means of dies and are sewed by a machine of peculiar construction. The best woolen, thread and silk gloves are made by cutting and sewing, but cheaper grades are made by knitting and weaving. France supplies the world with most of the finer and more expensive gloves, but the United States leads in the manufacture of men's gloves, and the center of the industry is in Fulton County, N. Y. About three million dozen pairs of leather gloves and mittens are made in the United States each year.

Gloversville, *gluv'urz vil*, N. Y., a city in Fulton co., 54 mi. n. w. of Albany, on the Fonda, Johnstown & Gloversville railroad. It is the most extensive glove manufacturing center in the world, producing, with its neighboring city of Johnstown, more than half the entire output of the United States. The place was settled at the beginning of the Revolution and was known as Stump City until 1832. It was chartered as a city in 1890. Population in 1910, 20,642.

Glow'worm. See FIREFLY.

Gloxin'ia, a genus of plants, distinguished by the nearly bell-shaped corolla, which is divided



GLOXINIA

into lobes which are usually more or less irregular. The leaves are soft and velvety. The species are natives of tropical America and are valued as among the greatest ornaments of our gardens, owing to their richly colored leaves and their ample, graceful, delicately tinted flowers.

Gluck, *glook*, CHRISTOPH WILLIBALD (1714-1787), a German musical composer, born in Bavaria. He had little musical education, but in 1740 he was employed to compose an opera for the court theater of Milan. It was a triumph, in spite of the innovations of style which the author introduced. Later he went to London and there, influenced by Handel's works, he began to develop a lyric genius which was destined to create a new order of musical composition. After producing many ordinary operas, he at last found a poet who sympathized with his ideas, and the result of their coöperation was *Orfeo ed Euridice*, performed publicly for the first time in 1762. In 1766 his second great opera, *Alceste*, was produced, which raised public feeling to the point of enthusiasm. The principles of the new school were that the opera should be a musical drama, not a concert in costume; that the music must voice fully the spirit of the text; that in accompaniments the instruments must be used to strengthen the expression of the vocal parts. The crucial point of his career was at the production of *Iphigenie en Aulide* in Paris in 1774, simultaneously with one of the same libretto by Piccinni, a master of the old school. The intensest excitement prevailed; all Paris took sides, but the victory was with Gluck. Gluck achieved his greatest work in *Iphigenie en Tauride*, which was produced in 1779.

Glucose, a syrup manufactured in the United States from the starch of corn. The corn is soaked for two or three days in water containing a small quantity of sulphurous acid, then ground into a coarse meal and treated with a mixture of starch and water. This causes the germs to float to the surface, while the heavier portion, containing the starch, settles. The germs are skimmed off and used in making corn oil. The starch is separated from other parts of the crushed corn by washing. Glucose is made from the starch by treating it with water and hydrochloric acid in steam-heated, closed vessels, called *converters*; sulphuric acid is used for some grades. The process requires from ten to thirty minutes, according to the grade of glucose required. When the liquid leaves the converter, the acid is removed by chalk or marble, if it is sulphuric, or by soda, if hydrochloric. The glucose is then filtered and boiled until the desired consistency is secured. Glucose is considered a healthful food and is used for canning fruits and in making jellies and confectionery. The manufacture of glucose has

become an important industry in the United States, and the country now exports many million dollars' worth each year. See CORN, subhead *Uses*.

Glue, an animal cement, made from the parings of hoofs and from the hides, tails and bones of animals. The parts are first thoroughly cleaned by soaking them in lime water; then they are boiled in soft water for several hours, until the glue is extracted. The liquid is then drawn off and allowed to cool. As the glue becomes solid it is cut into cakes, which are cut by wires into thin sheets. These are again cut into pieces about four inches square, then thoroughly dried and packed for shipment. White glue is bleached, but common glue is of a dark brownish color. Fish glue is made from the heads, offal and scales of fish. Glue is used for sticking pieces of wood together; in making ink rollers for printing presses; in thin solutions, for sizing paper and cloth; in calico printing, and in kalsomining. See GELATIN.

Gluten, a tough, elastic substance of a grayish color, found in the flour of wheat and other grains. It contributes much to the nutritive quality of flour and gives tenacity to its paste. A similar substance is found in the juices of certain plants.

Glutton, a carnivorous animal, about the size of a large badger, belonging to the weasel family. It inhabits northern Europe and America and is known also by the name of *wolverene*, or *wolverine*. The glutton is slow but persevering, cunning, fierce and of great strength and is famous for its voracious appetite for putrid flesh. The fur, which is shaggy and dark brown, is valuable, that from Siberia being preferred because of its glossiness.

Glycerine, *glis'ur in*, a transparent, colorless liquid, obtained from the by-products of candle and soap factories, by the action of alkalies or of superheated steam. It is as thick as syrup, has a sweetish taste and at a low temperature crystallizes into a solid mass. It absorbs moisture from the air and dissolves in, or mixes with, water and alcohol in all proportions, but it is insoluble in ether. It acts as a solvent on both inorganic and organic bodies. The uses of glycerine are very numerous. In the arts it is used wherever a substance requires to be kept more or less moist. It is also used in the preparation of tobacco, and of paper for printing; in spinning, weaving, rope making and tanning. It is an excellent preservative medium for meat and for natural history specimens; and its property

of lowering the freezing point of water makes it useful in gas meters, floating compasses and similar instruments. It is also extensively employed in the manufacture of nitroglycerine.

Glyptodon, a huge animal, ten or twelve feet in length, known only from fossil remains found in South America, Mexico and Texas and



GLYPTODON

Florida. It was related to the armadillo and had a solid armor of bony plates, forming one piece, like the shell of a turtle. Its tail and head were also covered by plated mail.

Gnaphalium, *na fa'le um*, a widely-spread genus of composite plants, whose foliage is usually covered with a white, woolly down. Its flower-heads are of the "everlasting" variety.

Gnat, *nat*, a general term applied to a number of different insects, of which the most common is the mosquito. Some species are so minute as to be almost invisible, and as the stings they inflict are highly annoying and irritating and the insects appear sometimes in countless thousands, they render life almost intolerable in some localities. See MOSQUITO; HESSIAN FLY.

Gneisenau, *gni'ze now*, AUGUST, COUNT NEITHARD VON (1760-1831), a Prussian general. He served with the German auxiliaries of England in America, but his first important service was in the early campaigns against Napoleon. After the Peace of Tilsit he was made a member of the body appointed to reorganize Prussia, but Napoleon's hostility was so great that he was forced to resign. In the later campaigns against Napoleon he did good service, and as chief of Blücher's staff he directed in large part the strategy of the Prussian army at Waterloo. He was made field marshal in 1825.

Gneiss, *nise*, a rock, composed of quartz, feldspar and mica, arranged in layers. The layers, whether straight or curved, are frequently thick, but often they vary considerably in the same specimen. Gneiss passes on one side into granite, from which it differs in its foliated structure, and on the other into mica slate. It is rich in metallic ores, such as gold, silver, cobalt, antimony, copper and iron, but it contains no

Gnostics

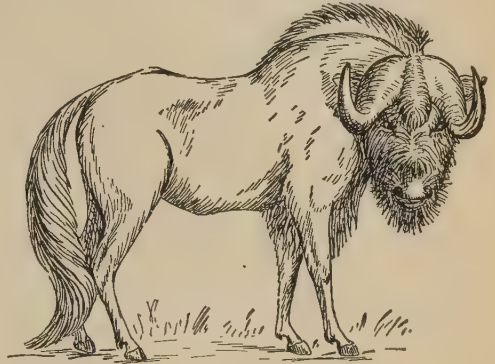
fossil remains. Porphyritic gneiss presents large, distinct crystals of feldspar, which traverse several of the foliated layers. Gneiss often contains hornblende, in place of mica, and then receives the name of syenitic gneiss. The only difference between this rock and granite consists in the structure, the materials of granite being crystallized promiscuously, those of gneiss being separated in layers. It is the principal rock of very extensive districts; it predominates in Norway and through all the north of Europe. It abounds in the Southern Alps and the Pyrenees and forms the loftiest chains of the Andes of Quito. In the United States, gneiss is a common rock, especially in New England and the eastern and southern parts of New York. See GRANITE; MICA.

Gnostics, *nos'tiks*, a general name applied to early schools of speculators, which combined the fantastic notions of the Oriental systems of religion with the ideas of the Greek philosophers and the doctrines of Christianity. They nearly all agreed on the points that God is incomprehensible; that matter is eternal and antagonistic to God; that creation is the work of the *Demiurge*, an emanation from the Supreme Deity, subordinate or opposed to God, and that the human nature of Christ was a mere deceptive appearance. The doctrines of the earliest Gnostics may be reduced to the following heads: God, the highest intelligence, dwells at an infinite distance from this world, in the Abyss, removed from all connection with every work of temporal creation. He is the source of all good. Matter, the crude, chaotic mass of which all things were made, is, like God, eternal, and it is the source of all evil. From these two principles, before time commenced, emanated beings, called *aeons*, which are described as divine spirits, inhabiting the Pleroma, or plenitude of light, which surrounds the Abyss. The world and the human race were created out of matter by one aeon, the Demiurge, or, according to the later systems of the Gnostics, by several aeons and angels. The aeons made the bodies of man of matter; hence the origin of evil in man. God gave man the soul. What are called gods by men are merely such aeons or creators, under whose dominions man became more and more wicked and miserable. To destroy the power of the creators and to free man from the power of matter, God sent the most exalted of all aeons, Christ. All the Gnostic systems admit a good and an evil principle and are usually classified into three schools, that of Basilides and Valen-

Goat

tinus; that of the Clementines; that of the Ophites, the last finding the perfect expression of truth in Jesus Christ. There have been no Gnostic sects since the fifth century.

Gnu, *nu*, the name given to two species of South African antelopes. The gnu of either sex has horns projecting slightly outward and downward, then bending abruptly upward, so



GNU

that the head looks like a buffalo's. It has bristly black hair about the face and muzzle, a white, stiff mane and horse-like tail. The animal is about nine feet long and stands about four feet high at the shoulder. Gnus live in herds and are said to be fierce when attacked, but when taken young they have been found capable of domestication. The *brindle gnu* is larger than the *common gnu* and has black stripes on the neck and shoulders and a black tail. When alarmed, either species will wheel in a circle once or twice before running away.

Goat, a well-known animal with hollow, erect horns, turned backward. The male is generally bearded under the chin. Goats are



ANGORA GOAT

nearly of the size of sheep, but they are stronger, less timid and more agile. They frequent rocks and mountains and subsist on scanty, coarse food. Their milk is sweet, nourishing and medicinal, and their flesh furnishes food. Goats are of many varieties, and it is not certainly

known from which the domestic animal is descended, though opinion favors the wild goat of western Asia. Domestic goats are common in all parts of the world, and are valued for their hair, milk and flesh. In many parts of Europe, Asia and Africa great herds are kept as cattle are kept elsewhere. Goats are often kept as pets and may be harnessed and driven by children. The skin is used for a variety of purposes and yields the leather well known under the name of morocco. The *Angora goat* is furnished with soft, silky hair, of a silver-white color, which hangs down in curly locks eight or nine inches long. Its horns are in a spiral form and extend backward rather than upward from the sides of the head. See CASHMERE GOAT.

Goat Island, a small island which divides the current of the Niagara River at Niagara Falls. It is connected with the American shore by a bridge. See NIAGARA FALLS AND RIVER.

Goat-sucker, a common name, especially in Europe, for a certain bird that was thought to suck the milk of goats and to poison them. *Nightjar* is another name for the same bird, which is related to our nighthawk and whip-poor-will.

Gobi, *go'be*, or **Shamo**, *shah'mo*, an immense tract of desert country, occupying nearly the center of the high tableland of eastern Asia, extending over a large portion of Mongolia and Chinese Turkestan. Its length is probably about 1800 miles, its mean breadth between 350 and 400 miles and its area 300,000 square miles. Its general elevation is over 4000 feet above sea level. The East Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels, horses and sheep. This tract is supposed at one time to have been a great inland sea. See DESERT.

God, the Supreme Being, worshiped by most civilized nations. The Christian God is an infinite and absolute being; a perfect personal spirit—eternal, immutable, omniscient, omnipotent and perfectly good, true and righteous. The arguments for the existence of God have been divided into the ontological, the psychological, the cosmological, the physico-teleological and the moral. The *ontological* argument starts from the idea of God itself and professes to demonstrate the existence of God as a necessary consequence from that idea. The manner in which it was stated by Anselm, in the eleventh century, is this: "God must be thought of as that being than whom none can be thought

greater; but this being, the highest and most perfect that we can conceive, may be thought as existing in actuality as well as in thought—that is to say, may be thought as something still greater; therefore God, or what is thought as greatest, must exist not only in thought but in fact." This argument has been presented in other forms. Descartes, while refuting Anselm's form of the ontological argument, revived it himself in another form. Applying the test of truth which he derived from his celebrated formula—"I think, therefore I am"—that whatever we clearly and distinctly perceive to belong to the true and unalterable nature of a thing may be predicated of it, he found on investigating God that existence belongs to his true and unalterable nature and therefore may legitimately be predicated of him. Another argument, called the *psychological*, was adduced by Descartes to prove the existence of God, which, although not the same as the ontological argument, appears to resemble it. It starts from the idea of a supreme and perfect being, but it does not assert the objective existence of that being as implied in its idea, but infers such objective existence on the ground that we could have acquired the idea only from the being which corresponds to it. The *cosmological* argument starts not from an idea, but from a contingent existence, and infers from it an absolutely necessary being as its cause. The argument is: Every new thing and every change in a previously existing thing must have a cause sufficient and pre-existing. The universe consists of a system of changes. Therefore the universe must have a cause outside of and before itself. The argument called the *physico-teleological* is that which is commonly known as the argument from design and has been fully illustrated by Paley in his *Natural Theology*. It is simply this, that in nature there are unmistakable evidences of the adaptation of means to ends, which lead us inevitably to the idea of one that planned this adaptation, that is, of God. The *moral* argument is derived from the constitution and history of man and his relations to the universe, being based on such considerations as our recognition of good and evil, right and wrong, the monitions of conscience and the fact that a moral government of the world may be observed. Another argument is based on the alleged fact that a belief in the existence of a supreme being is everywhere found to be implanted in the breast of man. This argument is used among others by Cicero,



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COLONEL GEORGE W. GOETHALS

Godard

and many thinkers are inclined to give a good deal of weight to it; still it is pronounced by others to be at best only a probable argument, if it may be accepted as valid to prove anything at all. Others argue the existence of God from the manifestations which he has made of himself to men, but these, as well as miracles, it is admitted even by Christian theists, can only be accepted as real by such as previously believed in the divine existence.

Godard, *go dahr'*, BENJAMIN (1849-1895), a French musician, born in Paris. He entered the Paris conservatory and soon attracted attention by his compositions, especially for the violin. They do not display remarkable genius, but are graceful and melodious. He also wrote several operas, none of which achieved special success, besides many symphonies, concertos and songs.

Godavari, *go dah'va re*, a large river of central India, which rises about 50 miles from the shore of the Indian Ocean, flows across the Deccan from the Western to the Eastern Ghats in a general southeasterly direction and, after being joined by several affluents, falls by three principal mouths into the Bay of Bengal, after a course of 900 miles. Before the river divides, three rocky barriers obstruct navigation.

Godfrey de Bouillon, *de boo yoN'*, (about 1058-1100), duke of Lower Lorraine and one of the leaders of the First Crusade. After the conquest of Jerusalem he took the title of baron and Defender of the Holy Sepulcher, refusing the title of king which his followers wished to bestow on him. At Ascalon with twenty thousand men he defeated the sultan of Egypt with four hundred thousand, and he then devoted himself to the organization of his government and drew up for his courts of justice a code of laws which was a complete embodiment of feudal jurisprudence. He was buried on Mount Calvary.

God Save the King, the national anthem of Great Britain. Its origin is somewhat obscure. It is claimed that Henry Carey was the author of both words and music, but there is also evidence that the hymn was adapted from a much older tune. The same music has been used for a national air in Germany and one in Russia, while in the United States one of the most popular of patriotic songs, *My Country, 'Tis of Thee*, is sung to it.

Godwin, MARY (1759-1797), an English writer, also well known by her maiden name of Wollstonecraft. She was married in 1797 to William Godwin, and their daughter was

Goethe

later Mrs. Shelley. Among her works are *Thoughts on the Education of Daughters* and *Vindication of the Rights of Women*.

Goethals, GEORGE WASHINGTON (1858-), American soldier and engineer, born in Brooklyn, New York. He graduated from the United States Military Academy at Annapolis in 1880, and was immediately appointed second lieutenant of engineers. He rose to the rank of chief engineer of the volunteer service in 1898, and in 1909 attained the rank of colonel in the regular engineer corps. He was chief of engineers during the Spanish-American War, and after February, 1907, was in complete charge of all work on the Panama Canal, which his engineering skill and administrative ability successfully hastened to completion. In 1914 he was made first governor of the Canal Zone.

Goethe, *gō' tē*, JOHANN WOLFGANG VON (1749-1832), the greatest figure in German



JOHANN WOLFGANG VON GOETHE

literature, born at Frankfort-on-the-Main, August 28, 1749. His father, who was a Doctor of Laws and an imperial counselor, was a well-to-do citizen and an admirer of the fine arts. At an early age young Goethe learned the French language, and a French theatrical company, performing at Frankfort, awakened his taste for the stage. Drawing, music, natural science, the elements of jurisprudence and the languages

occupied him until, in 1765, after the breaking off of a youthful love affair, he was sent to the University of Leipzig to prepare himself for the legal profession. Here he followed no regular course of studies, but he learned much about men. Goethe began at this period what he kept up throughout his life, the practice of embodying in a poem, or in a poetical form, whatever occupied his mind intensely; and no one, perhaps, was ever more in need of such an exercise, as his nature continually hurried him from one extreme to another.

In 1768 he left Leipzig, and after an illness of some length he went in 1770 to the University of Strassburg, to pursue the study of law, according to the wish of his father. At Strassburg he became acquainted with Herder—a decisive circumstance in his life, as Herder helped him to free himself from the restraints of French classicism and inspired his mind with views of poetry more congenial to his character than any which he had hitherto conceived. In 1771 he took the degree of Doctor of Jurisprudence and shortly afterward went to Wetzlar to practice law. While there he fell in love with a young lady who was betrothed to a friend of his, and he soon left Wetzlar in consequence. This was the experience which formed the basis of his *Sorrows of Werther*. The attention of the public was first forcibly attracted to him by his drama *Götz von Berlichingen*, which appeared in 1773, and in the following year he became world-famous on the publication of *The Sorrows of Werther*.

Not long after the publication of this work, Charles Augustus, the hereditary duke of Saxe-Weimar, made the acquaintance of Goethe, and when he took the government into his own hands, he invited Goethe to his court. Goethe accepted the invitation, and late in 1775 he arrived at Weimar. Wieland was already there, having been the duke's tutor; Herder was added to the band in 1776; Schiller was afterward one of its members for a few years; and other poets, critics and novelists were gathered round these chiefs. Goethe was the leading spirit of the group, even during the last quarter of the eighteenth century, when these men and others were constructing and guiding the literature of all Germany; and his supremacy became yet more absolute afterward, when for another generation he stood alone. In 1786 he set out on a journey to Italy, where he remained two years. This residence in Italy had the effect of developing still further his artistic powers. Here his *Iphi-*

genie was matured, *Egmont* was finished and *Tasso* was projected.

In 1790 was published the earliest form of the first part of *Faust*, which belongs rather to Goethe's whole life than to any particular period of it. At the time that Goethe was engaged in the production of these works he had been pursuing various other studies of a scientific nature with as ardent an interest as if these had belonged to his peculiar province. The result of his studies in botany was a work in which he gives expression to the view that the whole plant and all its different parts may be regarded as variously modified leaves. In the following year (1791) he began to apply himself to optics, and he published a work on this subject also. In 1791 he became director of the court theater at Weimar, and his work here, with the production of *Wilhelm Meister*, occupied him until 1792, when he followed Charles Augustus during the campaign of the Prussians against the revolutionary party in France. In 1794–1796 Goethe published *Wilhelm Meister's Apprenticeship*, a novel which has become well known to English readers through the translation of Carlyle and which contains some of the most beautiful songs ever written. His next work of importance was *Hermann und Dorothea* (1797), a narrative poem, in hexameter verse, the characters of which are taken from humble life. In 1806 Goethe married Christiane Vulpius, with whom he had lived since 1788 and of whom he always spoke with warmth and affection. In 1809 was published *Elective Affinities*, another novel, and between 1811 and 1814 appeared his autobiography, one of the finest autobiographies in any language. The *Westöstlicher Divan*, a remarkable collection of Oriental songs and poems, appeared in 1819. Goethe's last work was the second part of *Faust*, completed in 1831.

Gog and Ma'gog, names mentioned several times in the Bible, referring to a northern land. Ezekiel predicted the destruction of Gog and Magog by the Jews, and mention is also made of them in Revelation. Interpreters generally understand them to be symbolical expressions for the heathen nations of Asia. Gog and Magog are also the names given to two reputed giants of early British history, whose statues are erected in the Guildhall in London.

Gogol, NIKOLAI VASSILYEVITCH (1809–1852), a famous Russian writer. He held for a short time a government position and later had an instructorship in literature and history,

but gave up both positions to devote himself to literature. His first work, a series of sketches called *Evenings at a Farm House near Dikan'ka*, showed that he was a writer of no ordinary ability, and this fact was further proved by his later writings. Among these were two other series of sketches, *Mirgorod* and *Arabesques*; *Revizor*, a comedy, and *Dead Souls*. All of these works show a remarkable power of describing types of Russian life.

Goiter or **Goitre**, a disease which is marked by the swelling of the thyroid gland, situated in the front of the throat. It affects women more frequently than men, and cases of it are to be seen in most countries, though in some regions it is particularly prevalent.

Goktscha, *gok'chah*, or **Sevanga**, *syé vah'n'ga*, LAKE, a lake in Russian Armenia, occupying a triangular cavity 540 square miles in extent, at an elevation of 6400 feet above the sea. It receives the water of several streams, but has no considerable outlet.

Golcon'da, an ancient city of India, 7 mi. n. w. of Hyderabad. The ruins include the burial places of the ancient sovereigns of the kingdom of Golconda, and an ancient fortress, which is now used as a state prison. Golconda was of old famous for diamonds, which, however, were probably found in the territory to the south of the city and were merely cut and polished at Golconda. The expression "richer than Golconda" became proverbial.

Gold is a precious metal of a bright yellow color, the most ductile and malleable of all the metals (See DUCTILITY; MALLEABILITY). It may be beaten into leaves so exceedingly thin that one grain in weight will cover 56 square inches, and it will take 280,000 such leaves to make an inch in thickness. A single grain may be drawn into a wire 500 feet long, and an ounce of gold can be made to cover a tiny silver wire more than 1300 miles in length. It may also be melted and remelted with scarcely any diminution of its quantity. It is soluble in nitro-muriatic acid, or *aqua regia*, and in a solution of chlorine, but it does not tarnish on exposure to the air. It is one of the heaviest metals, being about nineteen and one-third times heavier than water.

The fineness of gold is estimated by carats, pure gold being twenty-four carats fine. Jeweler's gold is usually a mixture of gold and copper in the proportion of three-fourths of pure gold to one-fourth of copper. Gold is seldom used for any purpose in a state of perfect purity, on

account of its softness, but is combined with some other metal to render it harder. Standard gold, or the alloy used for the gold coinage, consists of twenty-two parts of gold and two of copper and is therefore called twenty-two carats fine. Articles of jewelry in gold are made of every degree of fineness up to eighteen carats, that is, eighteen parts gold to six parts alloy. The alloy of gold and silver is found already formed in nature. It is distinguishable from that of copper by its pale yellow color, the copper alloy having a color bordering upon reddish-yellow. Palladium, rhodium and tellurium are also met with as alloys of gold.

Gold has been found in smaller or larger quantities in nearly all parts of the world. It is commonly found in reefs, or veins, amid quartz, and in sand and gravel; it is separated, in the former case, by quarrying, crushing, washing and treatment with mercury. The rock is crushed by machinery and then treated with mercury, which dissolves the gold, forming a liquid amalgam. The mercury is then distilled, and the gold is left behind. According to another method the crushed ore is fused with metallic lead, which dissolves out the gold, the lead being afterward separated by placing the alloy in a porous cup and heating. The lead melts at a lower temperature than the gold and is absorbed by the cup, leaving the gold free. This process is called *cupellation*. Gold is extracted from sand and gravel by washing and is obtained in the form of dust, grains and nuggets.

In modern times large supplies of gold were obtained from Peru, Bolivia and other new countries. Till the discovery of gold in California, a chief source of the supply was the Ural Mountains, in Russia. An immense increase in the total production of gold throughout the world was caused by the discovery of gold in California in 1848, and the opening of the equally rich gold fields of Australia in 1851. Latterly the yield from both sources has considerably decreased. Gold mines have also been extensively worked in New Zealand. In British Columbia and the Yukon are the chief Canadian gold fields, but the metal is also found in Nova Scotia, Ontario and Quebec. Saskatchewan has a few small placer mines. In the United States, apart from California, gold in considerable quantities is found in many states and territories, chiefly Colorado, Dakota, Idaho, Montana, Nevada and in Alaska. South Africa has recently taken a conspicuous position as a gold-

producing country, the mines of the Transvaal being among the most valuable in the world. Natal and New Caledonia have also important gold fields. The annual production of gold for the world amounts to about \$450,000,000. Of this Australasia produces about \$72,000,000; Africa about \$150,000,000, and the United States about \$95,000,000.

Gold-beating, the art or process of producing the extremely thin leaves of gold used in gilding. The gold which is beaten into leaf is almost pure metal, which has been melted at a greater temperature than fusibility requires. This extra heat gives the gold a greater malleability. It is cast into bars or flat ingots and sent to the gold beater in that form. The workman rolls it into a long, thin ribbon about $2\frac{1}{2}$ inches wide and then cuts the ribbon into squares. These squares are placed between sheets of peculiar paper, known as "French" paper. It looks like exceedingly close-grained oil paper, and each sheet is about five inches square. Three hundred sheets are piled on one another, and a square of gold is laid on the paper between each two sheets. This forms a book, or, as the gold beaters call it, a *cutch*. The gold beater slips bands of parchment over the cutch, binding all the leaves with the gold squares between them into a solid block. The cutch is laid on a block of stone, which has been faced up square, and with a twenty-pound cast-iron hammer the gold beater begins to flatten out the gold. The hammer falls on the center of the cutch for a time, thus driving the gold out. The cutch is beaten until the gold has expanded to the size of the sheets of French paper. Each sheet of gold is then removed and cut into four squares, so that each sheet is evenly squared. The leaves of gold are cut with a *filling wagon*, which consists of two pieces of sharp-edged reed or bamboo, set in a frame so that the parallel cutting edges will divide the leaf into the proper size in one cut. The leaf is cut on a soft piece of leather, so that steel knives cannot be used. The leaf is handled with pincers made of boxwood. The quartered sheets are laid in the *shoder*, which is like the cutch, except that the leaves are gold beaters' skin. About 1000 of the gold squares are placed in the shoder, and this pile is beaten with a twelve-pound hammer for an hour. Again the leaves are cut into quarters and placed in the *mold*, which, like the shoder, is made up of gold beaters' skin, and the hammer pounds it for nearly seven hours, until the gold is spread out to the size of the mold. The leaves are then

ready to be cut into squares $3\frac{3}{4}$ inches on a side and laid in books, 25 leaves to each book, 20 books to a pack, so that a pack contains 500 sheets of gold leaf.

Dentists use gold leaf for filling teeth because gold will weld into a solid mass when cold. The dentist's gold leaf is not put through the shoder and mold, but is taken from the cutch, as they use a heavier leaf than gilders, bookbinders and sign painters.

Silver and aluminum leaf are also important products and are made in the same way. Archaeologists have found gold leaf on jars and other household utensils that were made 2000 years B. C. The art was well known in the time of Homer and Pliny. African travelers have found natives who were quite expert in hammering gold into fine sheets.

Gold Coast, a British crown colony in West Africa, extending along the Guinea coast for 350 mi. and stretching inland to an average distance of 50 mi., having an area of about 40,000 sq. mi., exclusive of Ashanti and a protectorate, annexed in 1901. The chief forts and settlements are Cape Coast Castle, Elmina, Accra, the capital, Axim, Saltpond and Winneba. The soil is exceedingly fertile, but the climate is unhealthful. The chief products are gold, palm oil, ivory, copal and caoutchouc. Population in 1911, 1,502,899.

Golden Age, the legendary period in the history of almost all races, supposed to have been a time of perfect innocence and enjoyment; the earth was common property and brought forth without cultivation all things necessary for happy existence, while man and beasts lived in perfect harmony. Among the Romans this period was supposed to correspond with the reign of Saturn.

Golden Bull, the name given to the decree issued by Emperor Charles IV in 1356, to regulate the manner of election of the emperors and the number and rights of the electors. The number of electors was fixed at seven—the archbishops of Mainz, Cologne and Trèves, the king of Bohemia, the count palatine of the Rhine, the duke of Saxony and the margrave of Brandenburg. It was provided that in case of an interregnum the administration of the Empire should lie with the elector palatine and the elector of Saxony. The vital question as to what part the pope should have in the affairs of the Empire was left untouched.

Golden Fleece, in classical mythology, the fleece of gold in quest of which Jason made the

Argonautic expedition to Colchis. See ARGONAUTS; JASON.

Golden Gate, THE, a channel which connects San Francisco Bay with the Pacific Ocean. It is one mile wide and four miles long and is of sufficient depth for ocean steamers. On the south shore are Forts Pointe and Mason. Drake named this channel about 1578.

Golden House, the palace of Nero, built in Rome and so called because of its magnificence and beauty. In its court was a colossal statue of Nero, 120 feet high. The building extended over most of the Esquiline Hill and over that part of the land on which are the ruins of the Colosseum. There are few remains of this palace.

Golden Number. See METONIC CYCLE.

Golden-rod, a genus of the Compositae, chiefly natives of North America, where are found more than one hundred species. Most of the golden-rods have erect, rod-like stems, with little flowers, usually yellow, packed in very small heads, which are themselves grouped together to form large, showy clusters. No wild flower is a greater autumn favorite than the golden-rod.

Goldfinch, a favorite cage bird in Europe, much loved because of its pleasing song and its fondness for those who tend it. It is a beautifully colored finch, in which red, yellow, black and white are pleasingly mingled. A common bird throughout Europe, it has been introduced into the United States, and large numbers live in the vicinity of eastern cities.

Goldfish, the name of a beautiful species of carp, found in the fresh waters of China. It is



FANTAIL GOLDFISH

greenish in color in the natural state, the golden yellow color being found only in domesticated specimens and retained by artificial selection. These fishes are reared by the Chinese in small ponds and in basins or porcelain vessels and are kept for ornament. By careful selection, many strange varieties and monstrosities have been propagated. They are now distributed over nearly all the civilized parts of the world and are

commonly kept in aquariums. In large ponds they readily revert to the color of the original stock.

Gold Lace, a fabric woven of gilded silk threads, which are made in the following manner: A rod of silver is covered with gold leaf and drawn into a wire so fine that a mile of it weighs only an ounce. This delicate wire is then flattened, extended still farther and twisted compactly around a silk thread.

Goldsb'oro, N. C., the county-seat of Wayne co., 50 mi. s. e. of Raleigh, on the Neuse River and on the Southern, the Atlantic Coast Line and other railroads. The city is in an agricultural region and has cotton and oil mills, machine shops and manufactories of furniture, agricultural implements and other articles. It has a public park and is the seat of a state normal school for negroes, the Eastern Insane Asylum and an Odd Fellows' orphanage. Population in 1910, 6107.

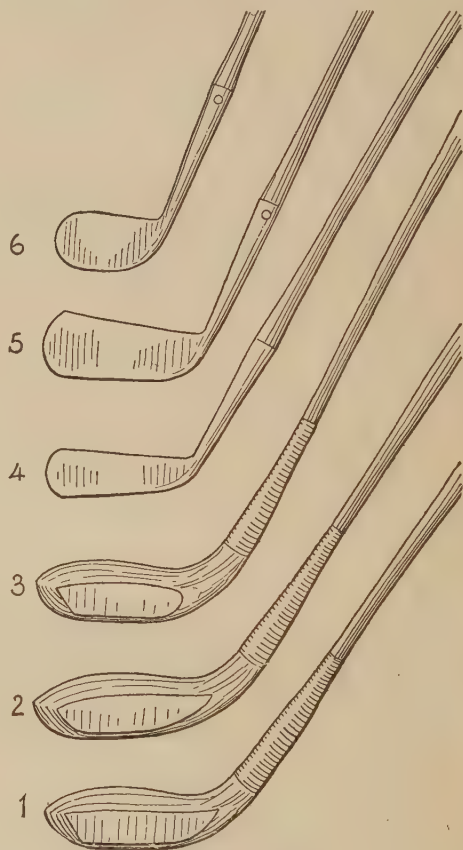
Goldsmith, OLIVER (1728-1774), an Irish writer of prose and verse, born at Pallas, County Longford, Ireland. He graduated from Trinity College, Dublin, and was advised by an uncle, who had already borne a large part of the expenses of his education, to prepare for holy orders. Rejected for holy orders, he became tutor in a family, but soon lost his situation on account of a dispute with the master of the house over a game of cards. He then went to Edinburgh to study medicine. Here he remained eighteen months, during which time he acquired some slight knowledge of chemistry and natural history. At the end of this period he went to Leyden, where he studied for nearly a year, and afterward he wandered over a large part of France, Germany, Switzerland and Italy. He had no money to pay his expenses during this walking tour, but his kindness and humor won him friends everywhere, and his skillful playing of the flute gained him a scanty living. While at Padua he took a medical degree.

He reached London in 1756 with a few cents in his pocket, and then followed some years of hard experience as a chemist's assistant, a medical practitioner, a proof reader and a school usher. Turning his attention to writing, he conducted a department in the *Monthly Review* and wrote essays in the *Public Ledger* and in a weekly pamphlet entitled *The Bee*; but it was not until the publication, in 1764, of *The Traveler* that he won recognition. Two years later appeared *The Vicar of Wakefield*. This novel, which to the present day is popular, was sold to the publishers

for sixty pounds, that Goldsmith might obtain money to pay his landlady, who had had him arrested for debt. In 1768 his comedy of *The Good-natured Man* was acted at Covent Garden with but indifferent success, but *She Stoops to Conquer*, produced some years later, attained at once the great popularity which it has kept to the present day. His poetical fame was greatly enhanced by the publication of his *Deserted Village* in 1770. Goldsmith completed, as mere task-work, histories of England, Greece and Rome, and a *History of the Earth and Animated Nature*, of no scientific value. Recognized as one of the great writers of the time, he was sought after by the most famous literary men and was a member of the renowned club to which Johnson and Reynolds belonged. His last days, however, were embittered by the pressure of debt, incurred partly by his improvidence and partly by his generosity. The manners of Goldsmith were eccentric, even to absurdity; but his kindly and sympathetic nature and his rare humor always won him loyal friends. Washington Irving has written a remarkably sympathetic biography of Goldsmith.

Golf, a popular outdoor game, played with clubs and balls over large fields, or *links*. A series of small, round holes are cut in the turf at distances of from 100 to 600 yards or more from one another, according to the nature of the ground, and these are arranged to form a circuit, or *round*, the ninth or eighteenth hole being near the starting point. These holes are about $4\frac{1}{2}$ inches in diameter and at least 4 inches deep. Each one is marked by a metal flag on an upright iron rod, which is removed from the hole during play and put back afterwards to guide succeeding players. Around each hole the ground is made perfectly level and is covered with a short, velvety turf, so that the last strokes toward the hole may be made with no obstacle in the way. This smooth grassy plot is called the *green*. Between the holes obstructions of various kinds are permitted. These are either such natural things as hills, rocks and brooks, or they may be artificially constructed ditches and mounds, all intended to make the play difficult and so to demand greater skill of the player. If played by two, the game is started by one of the players putting his ball on a little *tee*, or elevation of sand, and driving it as far as possible toward the first hole. As soon as he has played, his opponent begins in a similar manner, and from then on they play alternately from the spots where their balls lie, until both have *holed out*, that is, put their

balls into the first hole. The one who does this with the fewer strokes wins that hole. The balls are then taken to a spot near the first hole, and there they are driven off from a tee as before, except that the winner of the first hole is the first to play on the second. After this manner the game is continued until the nine holes are played. Two styles of game prevail. In one style the winner of the game is the person who



GOLF CLUBS

1, Driver; 2, brassie; 3, putter; 4, cleek; 5, iron; 6, niblick.

puts his ball in the nine holes with the fewer strokes. In the other style, the person who wins the most holes wins the game. The former is known as *match play*; the latter, as *medal play*. Three or four or more may play at one time with such modifications of the rules as are made necessary. The clubs, or sticks, are of different sizes and shapes, according to the use to which they are put. One club is designed to drive the ball a long distance; another, to raise it high in the air; a third, to take the ball out of

a difficult position; a fourth, to use on the green only. Each club has its own particular name, and different players sometimes favor different clubs for the same purpose. The ball is small and round and is painted white, in order that it may be distinctly seen. Usually the surface is more or less roughened, so that the clubs will catch it more fairly.

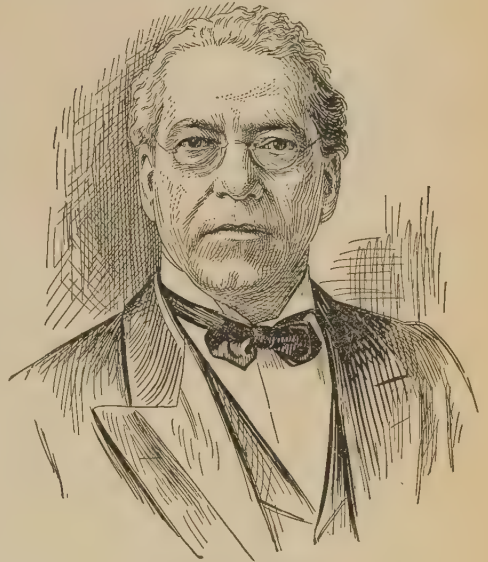
No one of the outdoor games has more exacting rules or is played with greater formality. There are public links in the parks of large cities; but as a rule the game is played on grounds belonging to private clubs or associations, and by members only. The game is a social one, played principally by well-to-do people, and the rules of etiquette are perhaps more strictly observed than in any other outdoor pastime. Contests are often held between different clubs, and tournaments in which several clubs take part are not uncommon. Every year a national tournament is held, and not infrequently players come from abroad to take part in these. The best players have an astonishing amount of skill, and the number of strokes required to carry the ball over difficult ground and into the hole is surprisingly small.

Goli'ath, a giant of Gath, slain by David (*I Sam.* XVII). His height was "six cubits and a span," which, taking the cubit at twenty-one inches, would make him a little over eleven feet. The Septuagint and Josephus read, "*four* cubits and a span."

Gomez y Baez, *go'mes e bah'es*, MAXIMO (1826-1905), a Cuban general, born at Bani, Santo Domingo. He served in the Spanish army, but became an opponent of Spanish rule in Cuba, quit the army and settled as a planter. During the insurrections of 1868-1878, he was an active commander of the Cuban forces. At the close of the struggle he went to Jamaica and then to Santo Domingo, but in 1895 returned to Cuba and became general in chief of the forces of the Republic. When the Americans landed in the island, he showed marked friendship and coöperated with them throughout the campaign. He was deposed from the command of the army in March, 1899, for receiving for his troops the \$3,000,000 voted by the American Congress.

Gomp'ers, SAMUEL (1850-), an American labor leader, born in London, Eng. When a young man he came to America, where he became interested in the cause of labor and the betterment of the working classes, while employed at his trade as a cigar maker. He was one of the founders of the American Federation of Labor

and was its first president, being reëlected annually for many years, with one exception. He is also a vice-president of the National Civic Federation.



SAMUEL GOMPERS

Gon'dola, a sort of barge, curiously ornamented, navigated on the canals of Venice. The middle-sized gondolas are upward of 30 feet long by 4 feet wide, and they always terminate at each end in a sharp point, which is raised perpendicularly, to about the height of a man. Toward the middle of the barge there is a curtained chamber for passengers.

Gonsalvo de Cordova, *gon thahl'vo da kor'do vah* (GONZALO HERNANDEZ Y AGUILAR, about 1453-1515), a famous Spanish commander, known as the *Great Captain*. He distinguished himself in the Portuguese War, which began in 1475, and in the war with the Moors, which ended with the conquest of Granada in 1492. In 1495 he was sent to assist Ferdinand, king of Naples, against the French, and in less than a year he had driven the French out of Naples. In 1500 Louis XII of France and Ferdinand of Aragon decided on the conquest of Naples, and Gonsalvo was sent to capture the city. He was successful in this enterprise, but Spain and France could not agree as to the division of the spoils, and a war broke out, in which Gonsalvo won the victory for Spain. He was appointed viceroy of Italy, but some years later he was deprived of his office through the jealousy of the king.

Goöber. See PEANUT.

Good Friday, a fast of the Christian church, in memory of the crucifixion of Jesus, kept on the Friday of Holy Week, that is, the Friday before Easter. It has been celebrated from a very early period. In the Roman Catholic Church the keeping of this fast includes prayers for all classes of people, heretics, schismatics, pagans and Jews, besides the "Adoration of the Cross," but no mass is said. In all Protestant churches the day is observed with much solemnity, except among Presbyterians. The practice of eating cross-buns on this day has now no religious significance.

Good'rich, SAMUEL GRISWOLD (1793-1860), an American author, best known as Peter Parley, the pseudonym under which he wrote. He edited and compiled about one hundred seventy volumes of children's books. In Hartford, and afterward in Boston, he conducted various magazines, and at one time or another he had on his staff many writers who afterward became famous, among them Nathaniel Hawthorne and Nathaniel Parker Willis. In 1851 Goodrich acted as American consul at Paris, and while there he published in French a work on American geography and history. Among the works which were entirely written by him are *Sketches from a Student's Window*, *Poems* and *Sow Well and Reap Well*.

Good Roads Movement. In the demand for good roads which has spread throughout the country, no other one factor has been so important as the automobile. It is only within the last few years, therefore, since automobiles have been commonly used, that the demand has become so strong that county, state and national governments are turning their attention to means of satisfying it. There are those who believe that the question of good roads outside of thickly settled communities is chiefly a national problem, and they have gone so far as to insist that the federal government should construct and maintain a "broad and comprehensive system of highways." Investigation proves, however, that it would cost about \$660,000,000 to build such a road and \$92,000,000 annually to keep it up—obviously prohibitive sums. Previous to 1914 the national government gave aid chiefly through its "good road train" (see ROAD) or through small appropriations, but early in that year a bill was passed providing that \$25,000,000 annually be divided among the states for road improvement, each state government to provide an amount

equal to that which it received. Many of the states, especially New Jersey and Massachusetts, had previously been very generous in their road appropriations, and it was believed that the new measure would act as a spur to all.

One of the most important outgrowths of the good-roads agitation is the plan for the so-called Lincoln Highway, which is to stretch from sea to sea. The president of the Lincoln Highway, in writing of the plans, says that it is to "last for all time, as does the Appian Way," and to be "a broad, smooth, dustless thoroughfare, which will take one from New York through New Jersey, Pennsylvania, Wyoming, Colorado, Utah and Nevada to California." Most of the cost is to be cared for by pledges from those to be benefited—from automobile companies, cement companies and the like; so that it will not be a great drain on either state or nation.

Good Templars, INDEPENDENT ORDER OF, THE, a fraternal order, organized at Fayetteville, N. Y., in 1851. It is a temperance brotherhood, which combines the principles of teetotalism with certain rites, secret signs, passwords and insignia peculiar to itself. The first grand lodge was established in 1852. The organization consists of local subordinate lodges, county district lodges, national grand lodges and an international right worthy grand lodge. A juvenile order is also attached. There are now 100 grand lodges with over a half million members, including the Juvenile Order of nearly 200,000 members, located in many civilized countries.

Good Will, the benefit derived from a business beyond the mere value of the capital, stock, funds or property employed in it. Good will arises in consequence of the general public patronage and encouragement which the business receives, due to its constant and habitual customers, or to its location, reputation and business principles. It is legally considered a subject of sale or disposal, along with the stock, premises, fixtures and trade debts.

Good'win, NATHANIEL CARL (1857-), an American actor, born in Boston. His first appearance was in a play called *Law in New York*, in which he was very successful, and his next success was *Black-eyed Susan*. In 1877 he married Eliza Weathersby. For the next fifteen years most of his work was in light comedy. After this he played *A Gold Mine*, *A Gilded Fool*, *In Mizzoura*, *An American Citizen*, *Nathan Hale*, *The Cowboy and the Lady*, *When We Were Twenty-one* and *The Genius*.

Goodyear

He was married five times, his second wife being Maxine Elliott, a well-known actress.

Good'year, CHARLES (1800-1860), an American inventor, born at New Haven, Conn. His early education was meager, and he began his career in the manufacture of hardware in Philadelphia. His attention was early called to the improving of the processes of manufacturing rubber, which was sticky in warm weather and brittle in cold. By dipping the rubber in nitric acid, he ascertained that the surface was hardened, so that it was to a large extent free from these defects. This process was in general use in the manufacture of rubber shoes for many years. Goodyear still further continued his investigations, and by an accident he perfected his process of hardening or vulcanizing rubber. He was awarded the great coronal medal at the London Exposition in 1851 and the grand medal of honor at the Paris Exposition in 1855, and he was also presented with the cross of the Legion of Honor. His patents are now in general use in all countries in the manufacture of rubber, and credit is due him for discovering many practical uses of rubber. See INDIA RUBBER; RUBBER MANUFACTURE.

Goom'ti. See GUMTI.

Goose, a large web-footed bird, related to the duck and the swan. The domestic goose,



GRAY GOOSE

of which there are many varieties, all nearly alike, lives chiefly on land and feeds on grass. It is valued for the table, for its quills and for its fine, soft feathers, which are used in making pillows and mattresses. The *Canada goose* is the common wild goose of the United States, known in every part of North America. They are also found in Europe. In the spring these geese are seen flying northward in V-shaped flocks. As cold weather approaches, the geese return to the South. Other species are the *gray goose*, or *gray-lag*, of Europe and northern Asia, and the *pigeon goose*, of Australia and Tasmania.

Goose'berry, a low branching shrub, growing wild in Siberia, in the north of Europe and

Gopher

in North America. The branches are armed with numerous prickles and bear three to five-lobed leaves and inconspicuous flowers. The fruit is a succulent berry, very wholesome and



PIGEON GOOSE

agreeable, of various colors—whitish, yellow, green and red. Gooseberries are popular fruits for preserving and are extensively cultivated, being easily raised.

Gooseberry Worm or **Gooseberry Caterpillar**, the larva of a moth, one of the most destructive enemies of the European gooseberry. In America the fruit suffers from a different moth, known by the same name—a moth which has pale gray wings bearing a dark band and a whitish line near the base. The larvae live in the berries, several of which they spin together by means of a silk which they secrete.

Goose'foot is a genus of plants indigenous to the temperate parts of the Eastern continent. They are weeds common in waste places and bear small, greenish flowers, gathered in small clusters, which are themselves clustered openly. Several species are now troublesome in the United States.

Gopher, *go'fur*, the name of various burrowing animals, natives of North America. The



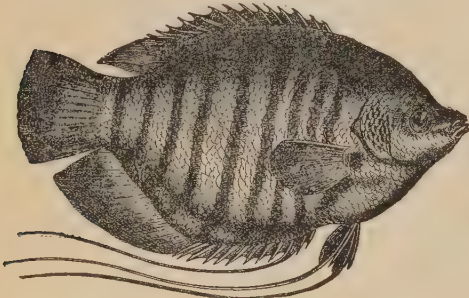
STRIPED GOPHER

true gopher is remarkable for having fur-lined pouches on the sides of its face and neck. In some species these pouches extend from the mouth to the shoulders. They are used in carrying food and also in carrying out dirt

Goramy

from the burrows. The common *striped gopher*, or *prairie squirrel*, of the West is a different animal. It does considerable damage to fields, making burrows so numerous that a network of passageways is formed under the surface. The name gopher was formerly applied by the early French settlers to any animal that honey-combed the soil. Several burrowing squirrels also have this name.

Go'ramy or **Gourami**, *goo'ra my*, a Chinese fish allied to the climbing perch. It is one of the few fishes that build nests, and these are



GORAMY

constructed by interweaving the stems and leaves of water plants. The goramy is considered excellent food. In Java it is kept in jars and is fattened for the market on water plants.

Gor'dian Knot. According to ancient legend, Gordius, a Phrygian peasant, was, through the intervention of the gods, raised to the honor of king of Phrygia. Through gratitude he dedicated to Zeus his cart and yoke, the knot of which was tied in an exceedingly skilful and complicated manner. Oracles had foretold that whoever should unloose the knot should be the ruler of all Asia. Many attempts had been made to untie the knot, but when Alexander the Great came to Gordium he cut the knot with his sword and asserted that he had realized the prophecy.

Gor'don, CHARLES GEORGE (1833-1885), a British soldier, known as *Chinese Gordon* and *Gordon Pasha*. He served through the Crimean War, and after the Chinese War in 1860 he remained in China, rose in rank and for his effective service in putting down rebellions was honored by China and by England. From 1877 to 1879 he was governor of the Sudan under the khedive. For a few months in 1882 he held an appointment at the Cape, and he had just accepted a mission to the Kongo from the king of the Belgians, when he was sent to withdraw the garrisons shut up in the Sudan by the insur-

Gordon

gent Mahdi. He was besieged in Khartum by the rebels and gallantly held that town for ten months. A British force under Lord Wolseley was dispatched for his relief, but arrived in



WILLIAM CRAWFORD GORGAS

January, 1885, to find that the town had been treacherously betrayed into the hands of the Mahdi and Gordon had been murdered.

Gordon, CHARLES WILLIAM (1860-), best known by his pen name, Ralph Connor, a Canadian author and Presbyterian minister, born in Ontario. He graduated from Toronto University and studied theology in Knox College. For several years he was missionary to the Canadian northwest territories and later became pastor of a church in Winnipeg. He wrote a number of interesting religious stories, abounding in vivid scenes from western life. *The Sky Pilot* and *The Man from Glengarry* have become popular, while *Black Rock* is probably the best known. *The Prospector*, *The Pilot of Swan Creek*, *Given*, *Corporal Cameron*, *The Doctor of Crow's Nest* and *The Foreigner* are others of his best books.

Gordon, JOHN BROWN (1832-1904), an American soldier and politician. After graduating from the University of Georgia he studied law and was admitted to the bar. At the outbreak of the Civil War he entered the Confederate army and won his way by hard service to the rank of lieutenant general. He was severely wounded at Antietam. From 1873 to 1880 and

again from 1891 to 1897 he represented Georgia in the United States Senate, and he was governor of the state from 1887 to 1890. He was a popular lecturer on war topics.

Gorgas, WILLIAM CRAWFORD (1854-), an American physician, surgeon-general of the United States Army. He was born in Mobile, Ala., studied at the University of the South, and received his medical training at the Bellevue Hospital Medical College. In 1880 he was made surgeon in the army, and received various promotions before his appointment in 1898 as chief sanitary officer in Havana. He remained there for five years, and did such efficient work that yellow fever was practically eliminated. For his services at Havana he was made colonel by a special act of Congress. In 1904 he was made chief sanitary officer of the Panama Canal Zone, and his work there practically transformed the district from a breeding spot for yellow fever and malaria to a healthful place where Americans can live and work without danger. In 1914 Gorgas was made surgeon-general of the United States army.

Gor'gons, in Greek mythology, three frightful beings whose bodies were covered with impenetrable scales, whose hands and teeth were of brass and whose hair was composed of serpents. They had the power of turning to stone every one who looked upon them. The two older ones were immortal, but Medusa was killed by Perseus.

Goril'la, the largest of the apes. It attains a height of about five and a half feet and is found chiefly in woody regions, around the equator in Africa. It is a thickset animal, with huge shoulders, long arms and short legs, and is clothed with a coat of coarse hair. Its strength is in proportion to its huge frame. Gorillas live mostly in trees and feed chiefly on such things as the fruit and cabbage of the palm tree, the fruit of the gingerbread tree, the papaw and the banana. Their ordinary gait is on all fours, but they readily rise to an erect position, and because of their shorter, broader feet, they walk more easily than the other man-like apes. Though gorillas are naturally timid, they make a terrible defense and rush at their enemies in the manner of bears. They make a sleeping place like a hammock, connecting the branches of the sheltered and thickly-leaved part of a tree with the long, tough, slender stems of parasitic plants, and lining it with the broad, dried fronds of palms or with long grass. The Phœnician navigator Hanno found the name gorilla in use in



GORILLA

the fifth century B. C., in West Africa, but nothing definite was known about the animal until the middle of the nineteenth century.

Gor'ky, MAXIM (in full, Alexei Maximovich Pyeshkoff, 1868-), a famous Russian novelist and reformer, born at Nijni Novgorod. His parents were in humble circumstances, and during early life he was employed successively as shoemaker, gardener, cook and clerk. Finally, he gave up all employment and became a tramp. During his travels he secured much of the material which he later used in his novels. Among his best-known works, all of which are extremely tragic and are written in an emotional, brilliant style, are *Song of the Falcon*, *Fomá Gordyěff*, *The Outcasts* and *Three Men*. In later years Gorky has devoted himself, even in his novels, to spreading the influence of the liberal political movement in Russia. He has also written several dramas, of which the most important are *The Summer Folk*, *The Children of the Sun* and *The Barbarians*, all of which are concerned with the political situation in Russia.

Gortchakoff, gor'cha koj, ALEXANDER MIKHAILOVITCH, Prince (1798-1883), a Russian diplomat. He served successively as secretary to the Russian embassy in London, counselor of the embassy at Vienna, plenipotentiary to Stuttgart and ambassador at Frankfort, before he was appointed, in 1854, minister of Russia at Vienna. In 1856 he was made minister of foreign affairs, and from the first his policy was one of opposition

to Austria. In 1863 he was made chancellor of Russia, and while in this position he showed a friendly spirit toward the Northern states in the American Civil War. As a result of the friendly relations between Bismarck and Gortchakoff, Prussia was able to enter upon the course which resulted in the unity of Germany, without fear that Russia would interfere on the side of Austria. As Germany grew more powerful, Gortchakoff's attitude became less friendly, and the outcome of the Russo-Turkish War and the Congress of Berlin led to a break between the two chancellors.

Gortchakoff, MIKHAIL, Prince (1795-1861), a Russian general. He took part as an artillery officer in the Battle of Borodino in 1812 and served in subsequent campaigns of the allies against the French. He took a prominent part in the Turkish war (1828-1829), the Polish war (1831), the invasion of Hungary (1849) and in the war with Turkey and the western powers (1853-1855). In the Crimea he held the command in Sebastopol during the siege. After the war he was made governor of Poland.

Goschen, *go'shen*, GEORGE JOACHIM (1831-1907), an English politician and financier. He entered Parliament in 1863. In 1868 he became president of the poor law board and subsequently first lord of the admiralty. On several occasions he found himself unable to move with the Liberal party; and when in 1886 Gladstone launched his Home Rule bill for Ireland, Goschen became one of the leaders of the dissenting Liberals who formed the Liberal Unionist party. Some time after, with the consent of his fellow Unionists, he accepted the office of chancellor of the exchequer in Lord Salisbury's government. He is the author of several financial and political pamphlets and of a well-known work on the *Theory of Foreign Exchanges*.

Gos'hawk, the largest of the short-winged hawks, formerly used in falconry. It is grayish above, white below, with ashy brown bars. In the United States there is but one species native; this is larger and handsomer than the European species and is commonly called the *hen hawk* or *chicken hawk*.

Go'shen, the name of the portion of Egypt assigned to Jacob and his family, when they entered the land to escape famine (*Gen. XLVII*). Goshen was located on the eastern border of the Nile delta, but its boundaries are indefinite. The land was especially well suited to grazing, and it was here that the Hebrews remained until they were enslaved by the Egyptians.

Goshen, IND., the county-seat of Elkhart co., 25 mi. s. e. of South Bend, on the Elkhart River and on the Lake Shore & Michigan Southern and the Cleveland, Cincinnati, Chicago & Saint Louis railroads. The city is in a fertile agricultural region and has flour and woolen mills, machine shops, wood-working establishments and large lumber mills and brickyards. It has a fine public library and a good high school. Population in 1910, 8514.

Gos'nold, BARTHOLOMEW (?-1607), an English navigator and explorer. In 1602, with an expedition probably equipped by Raleigh, he explored the New England coast from Maine to Buzzard's Bay and returned home with a valuable cargo of furs and woods, which, together with his personal influence, was the chief cause of the organization of the London Company that later colonized Virginia. He went with the first expedition in 1607, but died from fever soon after arriving in America.

Gos'pels (good news), the first four books of the New Testament, so called because they give an account of Christ's mission. The first three are known as the synoptic gospels, as they contain about the same accounts and give a summary or synopsis of Christ's Galilean ministry. They were written about 65 or 80 A. D. According to some critics, they depend on some previously written account. Matthew, as a Jew, pictures Christ as a royal Messiah; Mark writes for the Gentiles and shows Christ's love for the poor and the outcast. All give Christ's talks in the simple speech of the common people, with parables giving directions for Christian living. The gospel of John contains an account of Christ's life in Judea and many events not given in the other three. Its date is about 90 A. D. The teachings of Christ are given in figurative language, with Jesus himself as the subject. Some critics account for this difference in the fact that John was more closely associated with Jesus and that the account given was of work in very different surroundings. See MATTHEW, SAINT; MARK, SAINT; LUKE, SAINT; JOHN, SAINT.

Gos'samer, delicate, silk-like threads that are seen floating in the air, especially during the autumn. They are really the threads which have been spun by small spiders and torn loose from the supports to which they were fastened. Sometimes these threads are blown over long distances.

Gosse, *gos*, PHILIP HENRY (1810-1888), a naturalist of English birth, who lived in various parts of the United States, Canada and England. Among his books are *Birds*; *Reptiles and Fishes*;

Land and Sea, and *A History of the Jews*. His son, Edmund William, born 1849, has written a number of popular works on literary topics.

Gotha, *go'tah*, a town of Germany, in the duchy of Saxe-Coburg-Gotha, capital of the duchy of Gotha. It is 14 mi. w. s. w. of Erfurt. It contains a museum, a picture gallery, a library of 200,000 volumes and a large collection of coins and medals. The manufactures consist chiefly of woolen goods, porcelain, musical instruments, soap, toys and shoes. Population in 1910, 39,553.

Go'tham, a name given by Washington Irving to New York City.

Gothenburg, *go'ten boorg*, or **Göteborg**, *yu'-te boorg*, a seaport town in Sweden, second to Stockholm in population and trade. It is the capital of the län of the same name and is situated at the mouth of the Göta-Elf, in the Kattegat. Gothenburg is one of the best-built towns in Sweden and is the seat of a bishopric. It has manufactures of sail cloth, cotton and other goods and possesses shipbuilding yards, tobacco factories, breweries and sugar refineries. The trade is very extensive, the harbor being excellent and always free from ice. The town is noted for the system under which it licenses liquor-selling (See GOTHENBURG SYSTEM). Population in 1911, 170,606.

Gothenburg System, a method of regulating the sale of intoxicating liquors, adopted in Gothenburg, Sweden, in 1865. Under this system the monopoly of the traffic is given to a company which pays a tax for compensation. The dividends are limited to six per cent, additional profits being divided between the town, the agricultural society of the province and the general government. The result has been to diminish the sales, to separate the liquor problem from politics, to increase the purity of the liquor sold and to improve the character of the drinking-places. However, it has led to an increase in the sale of beer and to the private manufacture of other more injurious drinks.

Gothic Architecture. See ARCHITECTURE.

Gothland. See GOTLAND.

Goths, an ancient Teutonic tribe, occupying, when first known to history, the region adjacent to the Black Sea, north of the Danube. About the middle of the third century they began to encroach on the Roman Empire. In the fourth century the great Gothic kingdom extended from the Don to the Theiss and from the Black Sea to the Vistula and the Baltic. About the year 369 internal commotions produced the division of

the Gothic kingdom into the kingdom of the Ostrogoths (eastern Goths) and the kingdom of the Visigoths (western Goths). In 396 Alaric, king of the Visigoths, made an irruption into Greece, laid waste the Peloponnesus and became prefect of Illyria. He invaded Italy and sacked Rome in 409 and a second time in 410. After his death in 410 the Visigoths succeeded in establishing a new kingdom in the southern parts of Gaul and Spain, of which, toward the end of the fifth century, Provence, Languedoc and Catalonia were the principal provinces, and Toulouse was the seat of government. The last king, Roderick, died in 711 in battle against the Moors, who had crossed from Africa and who subsequently conquered the Gothic kingdom. After the fall of the Western Roman Empire, by the invasion of Odoacer in 476, the Eastern emperor Zeno persuaded Theodoric, king of the Ostrogoths, to invade Italy in 489. The Goth became king of Italy in 493 and laid the foundation of a new Ostrogothic kingdom, which came to an end in 554. Subsequently the Goths both here and in Spain entirely disappeared as a distinct people.

Gotland or **Gothland**, an island of the Baltic, 55 mi. e. of, and belonging to, Sweden. It is nearly 80 miles long and 35 miles wide at its widest part. It has a rocky, irregular coast and a high, limestone plateau, with fertile soil. Wisby, its chief town, was once a member of the Hanseatic League. Population in 1910, 55,219.

Gottenburg. See GOTHENBURG.

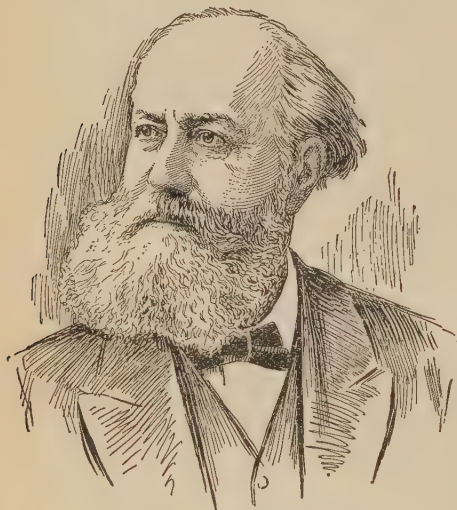
Göttingen, *gō'ting en*, a town of Prussia, in the Province of Hanover, on the Leine, 60 mi. s. s. e. of Hanover. It is a place of great antiquity. It is chiefly famous for its university, founded in 1734 by George II of England, elector of Hanover, and opened in 1737. The university has an average attendance of over 1000 students. Connected with the university are a museum, an observatory, an anatomical institute, a botanical garden and a library of over 500,000 printed volumes and 6000 manuscripts. The manufactures of Göttingen comprise woolens, chemicals, scientific instruments, leather goods, tobacco pipes and sausages. Population in 1910, 37,600.

Gottschalk, *goh't'shahlk*, LOUIS MOREAU (1829-1869), an American musician, born in New Orleans, La. His marked musical ability induced his father to send him to Paris to receive further education, and later he appeared in concert in France, the United States and South America, with uniform success. He died in Cuba while on a concert tour. His compositions

for the piano are numerous and well known, his masterpiece being *The Last Hope*.

Gouge, gowj. See CHISEL.

Gough, gof. JOHN BARTHOLOMEW (1817-1886), a temperance orator, born in England. He came to America when but a boy, worked on a farm in New York and afterward was for a time in a bookbindery in New York City. He lost his position through drinking, and for a time he earned a living by singing in saloons; but he was induced at last to sign a pledge, and from that time he spent years traveling about the country, lecturing on behalf of temperance reform. He attained a very wide reputation and gave his lectures several times in Europe. He published an *Autobiography*, a volume of sketches, *Sunlight and Shadow, or Gleanings from My Life Work*, and several volumes of lectures.



CHARLES FRANÇOIS GOUNOD

Gould, goold, GEORGE JAY (1864-), an American capitalist, born at New York, the son of Jay Gould. He was privately educated, and when he became of age he assumed direction of many of his father's railroad and other commercial enterprises. Under his energetic management the Gould interests were vastly extended and embraced a total railroad mileage of more than twenty-one thousand miles, besides large holdings in the Western Union Telegraph Company, the Equitable Life Assurance Society, the Pacific Mail Steamship Company, numerous national banks and other corporations. The Gould railway interests include the Wabash, the Missouri Pacific, the Texas and Pacific and the St. Louis,

Iron Mountain & Southern. See RAILROAD.

Gould, HELEN MILLER. See SHEPARD, HELEN GOULD.

Gould, JAY (1836-1892) an American capitalist, born at Roxbury, N. Y. He began active life as a surveyor, and in 1856 he entered the tanning and lumber business. Later he bought railroad stocks, disposed of them at a great profit and in 1859 established himself as a broker in New York City. He gained control of the Erie Railroad when it was in financial distress, by means more original than honorable, and constantly added to his railroad holdings, until he owned more than one-ninth the railroad mileage of the country (1880). His usual method was to depress the value of the stock in the open market, and then to buy quickly. In this way he secured control of the Union Pacific and the Missouri Pacific at a time when their stocks were almost worthless and developed them into paying roads. He was also a prime mover in the consolidation of telegraph lines and in the founding of the Western Union Company. In 1869 he was interested with James Fisk in an attempt to "corner" the gold market. It resulted in "Black Friday," one of the most disastrous financial episodes in American history. He left a fortune estimated at \$70,000,000.

Gounod, goo no', CHARLES FRANÇOIS (1818-1893), a French composer, born at Paris. He studied at the Conservatoire and afterward in Italy, winning distinction for his compositions. His first important mature work was *Faust* (1856), which raised him to a high rank among composers. Other operas followed, among which *Romeo et Juliette* (1867) is the best. Gounod's study of church music during his stay in Rome emphasized the religious tendencies of his nature. To these he gave expression in *Saint Cecilia's Mass* and other sacred music. He wrote also a *Messe Solennelle*, a motet, *Gallia*, and other choral works and songs. *Saint Cecilia's Mass* and the oratorios *Redemption* (1882), *Mors et Vita* (Death and Life) (1885), exhibit Gounod's mastery of musical technique as well as his deep, spiritual feeling.

Gourd, gord or goord, the popular name for a family of plants, as well as for the typical genus of that order. The fruit of these plants is also known by the name gourd. The plants are large, with annual or perennial stems, trailing or climbing by tendrils, and large alternate leaves. The corolla is either yellow, white or green and sometimes is large and handsome. The fruit is fleshy and succulent. There are more than

fifty genera and about three hundred known species of gourds, many of which are useful or remarkable. Among them are the squash, the melon, the cucumber, the pumpkin, the colocynth and the bryony. They are natives of both hemispheres, chiefly within the tropics, but the more valuable ones are now commonly cultivated in most parts of the world. On some species the outer coat, or rind, is so hard that bottles and water cups are made from the fruit.

Gout, *gout*, a constitutional disorder, giving rise to paroxysms of acute pain, with a specific form of inflammation, appearing chiefly in the male sex and returning after intervals. It is very often preceded by, or alternates with, disorder of the digestive organs. It seizes the patient usually at night, causing violent pains in the big toe or in the heel or calf of the leg. These pains last all night and are excruciating, especially if the patient moves or is jarred. A second night of pain is usually followed by sudden relief from pain, although swelling and fever remain in the limb. Similar attacks may occur at short intervals through a period of several weeks, or even months, the whole constituting what is commonly called a "fit of the gout." It may be acquired or hereditary. In the former case it rarely appears before the age of thirty-five; in the latter, it is frequently observed earlier. It appears that the disease is due to an excess of uric acid in the blood. Indolence, inactivity and too free use of sour wines, fermented liquors and very highly-seasoned and nitrogenous food are the principal causes. Strict regulation of the habits of life is one of the most important elements in the treatment of gout.

Government, *gub'urn ment*, a word used with various meanings, namely, to denote the act of governing, the persons who govern and the mode or system according to which the sovereign powers of a state—legislative, executive and judicial—are vested and exercised. In this last sense, government originated with the association of men in groups, or clans, its object from the beginning consisting in the establishment of justice, peace, security and liberty. In recent times difference of opinion has developed as to the real purpose and the extent of the functions of government. Some students believe that the activity of government should be confined to the fundamental and necessary functions of society as a whole, such as those mentioned above, considered in their narrowest sense. Others assert that the general welfare of the community should be promoted more directly

by government, through the extension of governmental function into such fields as the regulation of trade, manufactures and transportation.

Government receives its obedience primarily by reason of the force which it can exercise, but in modern times, in civilized communities, men have learned to obey government, not so much because of the actual coercive power which it possesses, as because of their realization that their best interests are closely bound to those of the state in which they live and of which they form a part. This force which induces obedience may be called the sanction of government; the former is the sanction of force; the latter, the sanction of reason.

By nature governments are of two kinds, autocratic or democratic. However, these two qualities may be blended in a particular form of government, so that in some of its activities it is controlled autocratically by one or few, while in others it is controlled wholly by the body of citizens. In form, governments are of three kinds; the *monarchy*, in which the governing power is vested in one individual; the *aristocracy*, in which a select portion of the community possesses all sovereignty, and the *republic*, in which sovereignty is retained by the whole community itself. However, in form, also, the classification of government cannot be perfectly or definitely made, since in some governments, such as that of England, though power nominally rests with the king, a single ruler, in reality it is diffused throughout the whole state, and the government is democratic in principle. Similarly, in some republics, such as the First Republic in France, power, though nominally in the hands of the people, is in reality exercised by a few or even one, and is oligarchical, or even monarchical, in principle.

Monarchical governments differ in their nature, being known as *absolute* or *limited*. Absolute monarchy exists when all the powers of legislation and execution are nominally centered in the hands of the monarch. Limited monarchy exists when the powers of legislation are shared with the persons forming the state. This may be done by the establishment of a constitution, either written or unwritten, framed by the people or their representatives or in accordance with their demands; or it may be done by the institution of a representative assembly whose powers are coördinate with those of the ruler. These two forms may be combined, the former being known as *constitutional government*, the latter as *representative*

government, the mixture as *constitutional representative government*. One of the interesting developments in government is that of the *federal state*, which is the association of several sovereign states into one central government, in which all have a voice and to which all owe allegiance. It differs from a so-called *confederation*, in that the states composing a federal state surrender certain powers of sovereignty to the central government, while in a confederation the constituent states retain all essential powers of sovereignty, delegating only certain powers to the central government, which powers may be withdrawn or changed at the will of any one state in the union (See STATE). For discussion of the forms of government in the important nations of the world see their several titles. See, also, CIVIL GOVERNMENT, Vol. VI.

Gov'ernor, a contrivance in mills and machinery for maintaining a uniform velocity with a varying resistance. A common form of steam engine governor consists of a pair of balls, suspended from a vertical shaft, kept in motion by the engine. When the engine goes too fast, the balls fly farther asunder and depress the end of a lever, which partly shuts a throttle valve and diminishes the quantity of steam admitted into the cylinder; and on the other hand, when the engine goes too slowly, the balls fall down toward the spindle and elevate the valve, thus increasing the quantity of steam admitted into the cylinder. By this ingenious contrivance, the quantity of steam admitted to the cylinder is exactly proportioned to the resistance of the engine, and the velocity is kept constantly the same. A similar contrivance is frequently attached to the gate of a water wheel, to regulate the supply of water by raising and lowering the gate.

Governor's Island, a fortified island in Boston harbor, Massachusetts, belonging to Suffolk County. Its fortifications form part of the defense of the harbor. Upon it is Fort Winthrop, an enclosed fort with open batteries.

Governor's Island, an island in the New York harbor, near the end of Manhattan Island. It belongs to the United States and is used for naval and military purposes, being fortified by forts Columbus, Castle William and South Battery.

Gow'er, JOHN (about 1325-1408), an early English poet, a contemporary and friend of Chaucer. His chief works are *Speculum Meditantis*, *Vox Clamantis* and *Confessio Amantis*, of which the first was a moral tract relative to

the conjugal duties, written in French rhymes; the second a metrical chronicle of the insurrection of the commons under Richard II, in Latin elegaic verse, and the third an English poem in eight books, containing about thirty thousand lines, relative to the morals and metaphysics of love.

Gozzoli, *got'so le*, BENOZZO (1420-1498), an Italian painter, born at Florence. He was a pupil of Fra Angelico and worked at Florence, Rome, Orvieto and Pisa. His name is specially identified with the great series of mural paintings in the Campo Santo, at Pisa, consisting of twenty-four subjects from the Old Testament, among which are *Life of Noah* and *Visit of the Queen of Sheba to Solomon*.

Gracchus, *grak'us*, a Roman family of the Sempronian gens, several members of which became famous. TIBERIUS SEMPRONIUS GRACCHUS became consul in 177 B. C. and again in 163. He married Cornelia, a daughter of Scipio Africanus and was the father of the two most celebrated Gracchi, TIBERIUS SEMPRONIUS (about 163-133 B. C.) and CAIUS SEMPRONIUS (159-121 B. C.). The brothers lost their father early, but received from their mother, Cornelia, a careful education. In 133 B. C. Tiberius was elected to the tribuneship. His first efforts were directed to a reform of the Roman land system, by the restoration or enforcement of the old Licinian law, which enacted that no one should possess more than five hundred acres of the public lands and that the remainder should be equally divided among the plebeians. This law, which was called after him the Sempronian, he revived, but with the introduction of several softening clauses. He was violently opposed by the aristocracy and by the tribune Marcus Octavius, whose veto retarded the passage of the bill. Tiberius, however, by exerting all the prerogatives of his office, managed to pass his bill. But fortune turned against him; he was accused of having violated his office and of aspiring to be king, and at the next election for the tribuneship he was killed. Ten years after the death of Tiberius, the younger Gracchus obtained the tribuneship. In the discharge of his office he first of all renewed his brother's law and revenged his memory by expelling many of his most violent enemies from the city. Several popular measures gained him great favor with the people, but the intrigues of the nobles ultimately caused his fall.

Grace, DAYS OF, in commerce, a certain number of days allowed for the payment of a

bill or note, after the day on which it becomes due on its face. In most states of the Union and Great Britain, the days of grace are three, the number of days allowable being determined by the law of the place where the instrument is payable. In other countries it varies from three to thirty. If the last day of grace is a bank holiday the instrument is payable on the next to the last day of grace.

Graces, *gra'sez*, in classical mythology, the goddesses of grace, daughters of Jupiter, from whom came everything beautiful and agreeable. According to most poets and mythologists, they were three in number, and Hesiod gives them the names of Aglaia (brilliancy), Thalia (the blooming) and Euphrosyne (mirth). Homer mentions them in the *Iliad* as attendants of Juno, but in the *Odyssey* they are spoken of as companions of Venus. He conceived them as forming a numerous troop of goddesses, whose office it was to render happy the days of the immortals. The three graces were usually represented slightly draped or entirely nude, locked in each other's embrace or hand in hand.

Grack'le or **Grak'le**, a genus of birds, of the starling family, inhabiting India and New Guinea. One species is the Indian *mina bird*, which can be taught amusing tricks and can imitate the human voice. A number of other birds in different parts of the world are called grackles. See CROW BLACKBIRD.

Gra'dy, HENRY WOODFIN (1851-1889), an American editor and author, born at Athens, Ga. He was educated at the University of Georgia and the University of Virginia. As editor and correspondent of various papers, he attracted attention for his articles on the South, and in 1882 he became managing editor and part owner of the *Atlanta Constitution*. He also won a reputation as a public speaker, especially on the theme "The New South."

Grafting, the art of propagating plants by inserting a bud or twig of one plant into the stock of another. The stem or branch into which the part is grafted is known as the *stock*, and the part inserted into the branch is called the *cion*; if the latter is a bud, it is known as the *bud*. There are various methods of grafting, known as budding, whip grafting, cleft grafting and crown grafting.

BUDDING. In budding, the bud from the axil of a leaf is inserted into the bark of a stock. The bud is prepared by cutting a shield-shaped section of bark, which usually includes a little of the wood, from the plant (See *b* in Fig. 1).

A piece of the leaf stock is left on the bark, to serve as a handle in inserting the bud. The stock is prepared by cutting a T-shaped slit in the bark (*a*, Fig. 1). The bark is then loosened from the corners where these cuts meet, and the bud is slipped under, being left in such a position that it protrudes from the cut just below where the vertical and cross sections meet. The stock is then wound with yarn or twine that will yield a little as the bud swells (*c*, Fig. 1).

WHIP GRAFTING. In whip grafting the cion and stock are cut so as to have notches and tongues that will exactly fit into each other (*a* and *b*, Fig. 2). The success of this style of grafting depends upon the cion and stock being of the same size. It is generally employed by nurserymen in the propagation of young trees. The prevailing practice is to cut the stock quite close to the root and graft a comparatively long cion upon it. The joint is wound and covered with wax or clay (*c*, Fig. 2). In the spring the plants are set so that the joint comes

just below the surface. As the plant grows, roots spring forth from the grafted cion, so that in a short time this part of the tree has roots of its own.

CLEFT GRAFTING. Cleft grafting is employed with trees that are too large for whip grafting. The branch to be grafted is sawed off, then split through the middle. The cion has one edge sharpened wedge-shaped and is inserted in the cleft in such a way that the bark of the cion will meet that of the stock (*a* and *b* in Fig. 3). The wound is then covered with wax to exclude the air and moisture (*c* in Fig. 3).

CROWN GRAFTING. In very large limbs, crown grafting is sometimes used. This is done by

FIG. 1

FIG. 2

FIG. 3

sawing off the branch as in cleft grafting, but instead of splitting the branch through the center the bark is loosened at two or three places and the wedge-shaped cion is inserted between the bark and the wood (*a* and *b* in Fig. 4).

Grafting is done upon the principle that the scion will reproduce its kind, regardless of the stock into which it is grafted, and upon the further principle that the sap, by a system of osmosis (See OSMOSIS), will pass from the stock into the cion. Only the most closely related species can be grafted on to each other with success. Usually plums and peaches can be grafted upon each other, as can apples and pears, but apple trees will not graft upon plum or cherry trees. Nurserymen employ grafting for the purpose of producing variety in plants and also to secure a hardy stock for the plant, as the stock into which the cion is grafted is usually that of a tree native to the locality and one that will withstand the exigencies of soil and climate better than the tree from which the cion was taken. Consult Bailey's *The Nursery Book*.



FIG. 4

Grafton, MASS., a village situated on the Blackstone River, 9 mi. s. e. of Worcester. It is of importance for its manufacture of boots and shoes, cotton goods and thread. Population in 1910, 5705.

Grafton, N. D., the county-seat of Walsh co., 40 mi. n. of Grand Forks on the Park River and on the Great Northern and the Northern Pacific railroads. This city is in a vast wheat region, has an extensive trade in the county and also has stockyards, grain elevators, flour mills, machine shops and other factories. The state institute for feeble-minded is located here. Population in 1910, 2229.

Grafton, W. VA., the county-seat of Taylor co., 82 mi. e. by n. of Parkersburg, on Tygarts Valley River. The city is the terminus of four divisions of the Baltimore & Ohio railroad and contains railroad shops, flour and planing mills, cigar factories and a number of wholesale houses. A national cemetery is located here, and the state reform school is at Pruntytown, 4 miles west of the town. Grafton was established as a railroad town in 1854 and was chartered as a city in 1899. Population in 1910, 7563.

Graham, WILLIAM ALEXANDER (1804-1875), an American politician, born in Lincoln co., N. C., educated at the University of North Carolina and admitted to the bar. He was elected to the state legislature in 1833 and was for a time speaker of the assembly. After serving a short term in the United States Senate, he was twice elected governor by the Whigs and was made secretary of the navy by President Fillmore, serving from 1850 until June, 1852. He was nominated for vice-president on the ticket with General Scott in 1852. Graham was for a time a member of the Confederate senate.

Graham Land, a tract of land in the Antarctic Ocean, discovered in 1832 by Biscoe, who took possession of it for Great Britain. See SOUTH POLAR EXPLORATION.

Grail, THE HOLY (spelled also *Greal* or *Graal*), the legendary vessel, supposed to have been of emerald, from which Christ dispensed the wine at the last supper and about which many legends centered. It was brought to England by the son of Joseph of Arimathea and was kept by his descendants for centuries, but was finally, owing to the sin of one of its keepers, taken back to heaven. The Grail was visible only to the pure of heart, or, according to other accounts, it struck blind all who looked upon it, except the pure. The legend of King Arthur became connected with the Grail stories, and many of his knights made quests in search of it. Three of them, Galahad, Perceval and Bors, had sight of it. The legends of the Grail have been used often as literary themes, and on the version which connects it with the Arthurian romance Tennyson based his *Holy Grail* in the *Idylls of the King*. Wagner's great music drama *Parsifal* is founded on a different version.

Grain Elevator, a building designed for the storage, handling and cleaning of grain. Elevators are located along the lines of railway or near docks. The most common ones have the form of a rectangular building, with high walls, surmounted by a cupola, which extends the entire length of the building and is from one to three stories high. The lower portion, or main part of the building, contains bins in which the grain is stored, while the cupola usually contains the machinery for weighing, moving and cleaning the grain, though in some buildings this is found in the basement or at one end of the main body of the building. The latest style of grain elevator consists of one or more cylindrical tanks, constructed of steel,

tile or concrete. Since these structures are fire-proof, they are much more desirable than wooden buildings. Grain is unloaded from the cars or from the vessel into the elevators by structures known as *legs*, which are movable boxes containing endless belts, to which buckets are fastened at even intervals. The lower end of the leg is placed in the hold of the ship or at the door of the car, and grain is received into a hopper, from which it is fed to these buckets as the belt is moved by machinery. In this way grain can be unloaded into the elevator and moved from the bottom of the lowest bin to the top, where it can be weighed and cleaned and sent to various bins or to any destination desired. The largest of these buildings will hold over a million bushels of grain, and some of them have machinery which will admit of handling at least 400,000 bushels in a day.

Grains, the name of the fruits of several grasses, as corn, wheat, barley, oats and rye. They contain gluten, starch, a sweet mucilage, an aromatic substance in the hulls, and much moisture. Grains furnish one of the chief foods of man, being ground into meal and flour, which are included in most articles of diet. The term grain is also used to designate the plants themselves. The raising of grains is among the chief agricultural industries. The most productive regions are the valleys of great rivers, such as the Nile, the Po and the Ganges, in the Old World, and the Mississippi, in the New World. The prairie region of the United States is the greatest grain-producing region of the world. The most important grains are described under their respective titles. See INDUSTRIES in Volume VI.

Grak'le. See GRACKLE.

Gram, the unit of weight in the metric system, equal to about 15.4323 grains in the English system. A decagram, or ten grams, equals 5.644 drams; a hectogram (100 grams) equals 3.527 ounces; a kilogram (1000 grams) equals 2.205 pounds; a myriagram (10,000 grams) equals 22.046 pounds.

Gramineae, *gram min'e ee*. See GRASSES.

Grammar, the science of language, which treats of the words of which a language is composed and of the laws that govern their use. English grammar is generally discussed under four broad divisions: *orthography*, which treats of the proper spelling of words; *etymology*, which treats of the parts of speech and their inflections; *syntax*, which treats of the relations of words in sentences, and *prosody*, which treats

of the laws of versification. *Comparative grammar* treats of the resemblances and differences of languages and of their relations, as the relation of the Anglo-Saxon to our present English tongue. See ENGLISH LANGUAGE.

Gram'pians, a range, or, rather, a series of ranges and elevated masses of mountains, stretching across Scotland diagonally, southwest to northeast, for about 150 miles. It commences in Argyleshire, and at the boundaries of Perthshire and Aberdeenshire may be said to separate into two distinct branches—one on the north side of the Dee, terminating near Huntly; the other running on the south side of that river, and terminating near Stonehaven. The Grampians comprise all the highest summits in Scotland—Ben Nevis, 4406 feet high; Ben Macdhuì, 4296 feet high; Ben Cruachan, Ben Lomond, Cairngorm and Cairntoul.

Gram'pus, a name for several marine mammals, allied to the dolphins. One species lives in the Atlantic Ocean and North Sea and grows to the length of twenty-five feet. It is remarkably thick in proportion to its length. The color of the back is black, the belly is a snowy white and on each shoulder is a large, white spot. The grampus, which has a remarkably voracious appetite, feeds upon other animals.

Granada, *gra nah'da*, formerly a Moorish kingdom in Spain, bordering on the Mediterranean, including what is now three provinces, Granada, Almeria and Malaga. Its area was about 11,000 square miles. The olive and vine are extensively cultivated, and fruit is very abundant. The sugar cane thrives in some parts.



GRANADA

Silver, zinc, iron, lead and coal are mined in considerable quantities. Manufactures are few, consisting chiefly of textiles, chocolate and bricks. After long forming part of the kingdom of Cordova, Granada became a separate kingdom in 1235. In 1492 it passed into the possession of the Spaniards. Population in 1910, 1,362,925.

Granada, a city in the south of Spain, capital of the Province of Granada. The streets rise

picturesquely above one another, with a number of turrets and gilded cupolas, the whole being crowned by the Alhambra, or palace of the ancient Moorish kings (See ALHAMBRA, THE). In the background lie the Sierra Nevada, covered with snow. The streets, however, are narrow and irregular, and the buildings are inferior to those of many other towns in Spain. The town is partly built on two adjacent hills, between which the Darro flows, traversing the town and falling into the Genil, which flows outside the walls. The cathedral is an irregular but splendid building; the archbishop's palace and the mansion of the captain-general are also noteworthy, and the Generalife, the summer palace of the Moorish princes, is second in beauty and splendor only to the Alhambra. There are several fine plazas, gardens and promenades.

The city was founded by the Moors before 800, and from 1036 to 1234 it was included in the kingdom of Cordova. In 1235 it became the capital of the Moorish kingdom of Granada and attained almost matchless splendor. In 1491 it remained the last stronghold of the Moors in Spain, but was taken by the Spaniards under Ferdinand and Isabella in 1492. Its prosperity continued almost without diminution till 1610, when the decree expelling the Moors from all parts of Spain brought about the decline from which it has never recovered. Population in 1910, 77,425.

Grand Army of the Republic, a patriotic society, organized in Decatur, Ill., April 6, 1868. Its chief objects are to strengthen the fraternal spirit among the veterans of the Union armies in the Civil War, to perpetuate the memory of those who have died and to assist needy members and their widows and orphans. Any soldier or sailor of the Union army who served between April 12, 1861, and April 9, 1865, and who was honorably discharged, together with all members of state regiments who were subject to Federal officers, are admitted to membership. The society is organized into state and territorial departments, which in turn are supported by local societies, of which there are about seven thousand. In 1890 the membership was 409,487, but this number has since constantly decreased, until in 1911 it was 191,346. The annual deaths amount to about nine thousand. Annual meetings, called encampments, are held in the leading cities of the United States. The Grand Army has not directly entered politics, but it has in many cases influenced elections and action by Congress, especially with regard to matters affecting the pension laws. See WOMEN'S RELIEF CORPS.

Grand Canyon of the Colorado. See COLORADO RIVER.

Grand Forks, N. D., the county-seat of Grand Forks co., 80 mi. n. of Fargo, on the Red River of the North and on the Northern Pacific and the Great Northern railroads. This city is in an agricultural and lumbering region and has manufactures of flour, lumber and foundry products, woollens and other articles. There is also a large trade in live stock and farm produce. It is the seat of the University of North Dakota, Wesley College and the Saint Bernard's Academy. The place was settled in 1871 and was incorporated ten years later. Population in 1910, 12,478.

Grand Haven, MICH., the county-seat of Ottawa co., 31 mi. w. of Grand Rapids, on Lake Michigan, at the mouth of the Grand River, and on the Pere Marquette and the Grand Trunk railroads. The city has an excellent harbor, is in a fruit- and celery-growing region and contains manufactures of refrigerators, furniture, lumber and other goods. Market gardening and fishing are also important industries. Akeley College for girls is located here, and the city has a public library and Highland Park. Grand Haven was settled in 1835. Population in 1910, 5856.

Grand Island, NEB., the county-seat of Hall co., 153 mi. w. of Omaha, on the Union Pacific, the Chicago, Burlington & Quincy and other railroads. The city is in a fertile agricultural region; it has an extensive grain trade, and the other industries include railroad shops, flour mills and beet-sugar, canning and broom factories. Grand Island College and the Nebraska Soldiers' and Sailors' Home are located here. The place was settled in 1869 and was incorporated three years later. Population in 1910, 10,326.

Grand Jury. See JURY AND TRIAL BY JURY.

Grand Manan' or Grand Menan', an island off the coast of Maine, part of the County of Charlotte, New Brunswick. Its length is about 22 miles, and its average width is about 5 miles. It is important chiefly by reason of its valuable timber and the fishing stations about its coast. Population, about 2700. This population is noticeably increased during the summer, as the island is a popular summer resort.

Grand Old Man, a name popularly given to Gladstone.

* **Grand Pre**, *grahN pray*, a beautiful village on the Basin of Minas, Kings co., Nova Scotia. The French settlers there were expelled by order of the English in 1713. It is of this incident that

Grand Rapids

Longfellow's *Evangeline* tells, though not with historical accuracy.

Grand Rapids, MICH., the county-seat of Kent co., 60 mi. w. by n. of Lansing and 30 mi. e. of Lake Michigan, on the Grand River and on the Michigan Central, the Pere Marquette, the Grand Trunk, the Lake Shore & Michigan Southern and other railroads. It has a large public library, a number of hospitals, including Butterworth and Saint Mark's, and several other charitable institutions, among which are the Evangeline Home, Holland Union Benevolent Association Home and Saint John's Orphan Asylum. Other prominent buildings include the city hall, the courthouse, the Federal building, the Y. M. C. A., the Masonic Temple, Elks Temple, the filtration plant and a number of business blocks.

The region around Grand Rapids is devoted to agriculture and fruit growing and contains extensive gypsum quarries. The Grand River here has a fall of about 18 feet and furnishes considerable water power for manufacturing. Every kind of article coming under the general term of furniture is manufactured here. There are 55 furniture factories, and Grand Rapids is the largest producer in the world of show cases, carpet sweepers, refrigerators, manual training equipment and sticky fly-paper. The city was settled in 1833 on the site of an abandoned Indian village and was chartered in 1850. Population in 1910, 112,571.

Grand Rapids or Greater Grand Rapids, WIS., a city situated on the Wisconsin River 96 mi. w. of the city of Green Bay and on the Chicago, Milwaukee & Saint Paul, the Chicago & Northwestern, the Wisconsin Central and other railroads. The industries include saw mills and other lumber factories, foundries, machine shops, grist mills, large paper mills and wood-pulp mills. Population in 1910, 6521.

Grand Remonstrance, the name given to the document in which the English House of Commons presented to Charles I a statement of the grievances which they had against him. It enumerated all of the illegalities of his government, such as the levying of forced loans and the abuses of the courts of Star Chamber and High Commission. Charles attempted to put off the subject with an evasive answer. The insistence of the House on the Grand Remonstrance was the immediate cause of Charles's attempt to arrest five members of Parliament, which in its turn was one of the causes of the civil war in England.

Granite

Grand River, a river of the United States, which rises in Grand Lake, Colorado, flows in a generally w. s. w. direction through a deep canyon and finally unites with the Green River in Utah to form the Colorado. Its total length is about 350 miles.

Grandville, *grahN veel'*, (1803-1847), a French caricaturist and book illustrator, whose real name was Jean Ignace Isidore Gérard. He was a contributor to *Le Charivari* and an illustrator of the works of Béranger and La Fontaine, of *Gulliver's Travels*, *Robinson Crusoe* and others. His works are carefully and accurately drawn and for this reason are sometimes hard and unexpressive.

Grange, *graynj*, (also called Patrons of Husbandry), a society or lodge of farmers in the United States, organized for the purpose of promoting the interests of agriculture; especially, for abolishing the restraints and burdens imposed on it by the commercial classes and the railroad companies and for doing away with middlemen. The influence of the Grange was important in the passage of several acts affecting the agricultural interests of the country, but they were also concerned in other legislation not of such excellence and eventually lost prestige, being largely absorbed by the Populist party.

Granite, an igneous rock (See IGNEOUS Rocks), generally composed of quartz, feldspar and mica, mixed without any regular arrangement of the crystals. The grains vary in size from that of a pin's head to a mass of two or three feet in diameter, but they seldom exceed the size of a large pea. When the grains are of this size or larger, the granite is said to be coarse-grained. Granite varies in color from almost white to black and from light pink to dark red. This variation is due to the different proportions of feldspar and to the different colors which that mineral takes. Granite is one of the most abundant of the igneous rocks, and that seen upon the surface of the earth was thrown into its present position by the convulsions of the earth's crust. Most of the granite is of very early formation, but some varieties are of a later period. Granite is very hard, strong and durable and is one of the most valuable building stones. It can be worked into any form, receives a high polish and withstands the weather well. The most extensive granite works in the United States are in Maine, New Hampshire, Vermont, Massachusetts and Minnesota. Syenite is a variety of granite in which the mica is replaced by hornblende. It is often stronger and more durable than granite,

Grant

and much of the granite of commerce is syenite, or syenitic gneiss (See GNEISS).

Grant, FREDERICK DENT (1850-1912), an American soldier, son of Ulysses S. Grant, born at Saint Louis, Mo. He graduated at West Point in 1871 and became lieutenant colonel in the United States army, but resigned in 1881. Afterwards he was minister of the United States to Austria, and later he was police commissioner of New York City. In the Spanish-American War he was appointed brigadier general of volunteers and for a time was in command in Porto Rico. He was transferred to the Philippines, where he performed notable service, in both civil and military capacities. In 1901 he was appointed brigadier general in the regular army and became commander, successively, of the departments of Texas, of the Lakes and of the East.

Grant, ROBERT (1852-), an American lawyer, novelist and essayist, born in Boston. He was educated at Harvard University, received the degree of Doctor of Philosophy and also graduated from the law school. He became a successful lawyer and judge, but it is as an author that he will be best remembered. *The Lambs*, *The Little Tin God on Wheels* and *The Confessions of a Frivolous Girl* are interesting to young readers. *Unleavened Bread* and *The Undercurrent* are the best of his fiction. Besides his stories he has written several volumes of essays.

Grant, ULYSSES SIMPSON (1822-1885), an American soldier and statesman, the eighteenth president of the United States. He was born at Point Pleasant, Clermont County, Ohio, and was educated in the common schools and at West Point. His first name was originally Hiram, but in later life he abandoned its use and signed himself simply U. S. Grant. After graduating from the military academy he served during the Mexican War, taking part in every important battle except Buena Vista and being brevetted captain for gallantry. In 1854 he resigned his commission and engaged first in farming and the real estate business near Saint Louis, without success. He then went to Galena, Ill., where he became a clerk in his father's leather store.

On the declaration of war, in 1861, he offered his services to the Union, but received no reply and was chosen captain of a company of volunteers. He was soon promoted to a brigadier generalship of volunteers. He seized Paducah, completed preparations for the navigation of the Tennessee and the Ohio, blocked the departure of reinforcements from Belmont, captured Fort

Grant

Henry and Fort Donelson and won the two days' Battle of Shiloh. He then gained a new victory at Iuka and, after repulsing the Confederates before Corinth, commenced operations against Vicksburg. After a siege of some months, in the course of which he took the town of Jackson and scattered an army under Johnston, Vicksburg surrendered. For this Grant was made major general in the regular army and was placed in command of the Mississippi division. After the defeat of Rosecrans at Chickamauga, he directed the great Battles of Chattanooga.



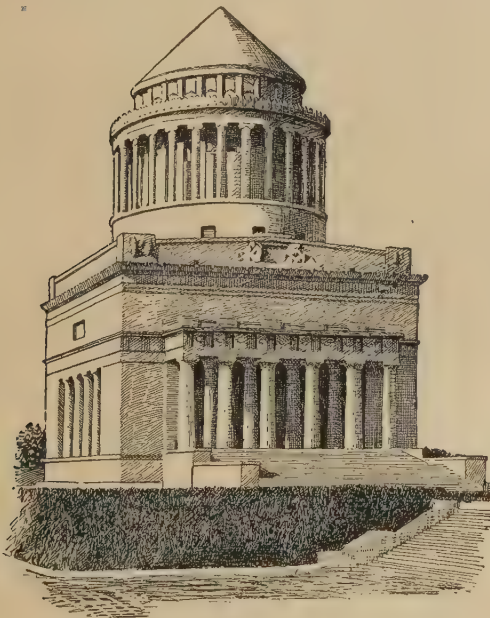
ULYSSES SIMPSON GRANT

In March, 1864, he was appointed lieutenant general and assumed command of all the armies of the United States. He planned a simultaneous movement upon the part of the eastern and western Union armies, which resulted in the overthrow of the Confederacy. He himself, in a succession of hotly contested battles at the Wilderness, Spottsylvania, North Anna and Cold Harbor, steadily advanced on Petersburg and Richmond. After a siege of many months, these fell, and Lee, defeated at Five Forks and completely surrounded, surrendered to Grant, April 9, 1865.

Grant returned to Washington, and in 1866 he was made general of the armies of the United States. After exercising important influence during the presidency of Johnson, generally in his favor, Grant was himself elected president in 1868. His administration was noteworthy for the reduction of the national debt and for the settlement of the *Alabama* dispute with England.

Grant

He was reelected in 1872. During his second term occurred the great panic of 1873 and the exposure of several official scandals, with none of which, however, he was personally connected. On his retirement he spent some time in travel, making a trip around the world. Later, he became involved in a company which exploited his name, failed and left him heavily in debt. He was candidate for the nomination of president before the National Republican convention at Chicago in 1880, but was unsuccessful. He endeavored to repair his fortune by writing and publishing his *Memoirs*, which he completed, after a heroic struggle, just before his death. The work was at once acclaimed as one of the most careful, complete and impartial descriptions of the Civil War, and it took high rank for its clearness, force and modesty as an autobiography.



GRANT'S TOMB
Riverside Drive, New York City

The principal characteristics of Grant as a soldier were determination and persistence. By this means he brought the war to a close, but through these methods, also, he committed his greatest blunders, overestimating the importance of patience and force, as compared with ingenuity and foresight. As a man he endeared himself to all by his high ideals and unassuming manner. As president his natural generosity often led him into judgments of men which offset his own ability and honesty. But all in all, his was one

Grape

of the most imposing personalities in American history. Consult Owen Wister's *Ulysses S. Grant* in the Beacon Biographies; Grant's *Personal Memoirs*; Wilson's *General Grant* in the Great Commanders series, and Church's *Ulysses S. Grant* in the Heroes of the Nations series.

Granulation, in surgery, the formation of little, grain-like, fleshy bodies on the surfaces of ulcers and running wounds, serving both to fill up the cavities and to bring their sides nearer together and unite them. The color of healthy granulations is a deep, florid red. Unhealthy livid granulations sometimes appear, and these are known as *proud flesh*.

Granville, *grahN veel'*, GEORGE LEVESON-GOWER, Second Earl (1815-1891), an English statesman. In 1855 he became chancellor of the duchy of Lancaster, president of the council and ministerial leader of the House of Lords; and in 1856 he represented the British crown at the coronation of Czar Alexander. From 1859 to 1866 he was again president of the council. In 1868 he was colonial secretary under Gladstone, and he was later foreign secretary, a post which he held until 1874. On the return of Gladstone to office in 1880, Lord Granville again became foreign secretary.

Grape, the fruit of a vine which grows both in the wild state and under cultivation. There are many varieties of both wild and cultivated grapes, and the vines are found in all continents. The grape has a woody stem, which climbs by attaching itself to supports by means of tendrils; it has a dark brown bark, resembling that of a tree. The leaves are large, broad and deeply three-lobed. The blossoms are small and of a greenish color. The fruit grows in clusters, is spherical or oval and varies in size from one-fourth of an inch to an inch in diameter, while in color it may be green, yellow, red, purple or variegated. The interior is a soft pulp, containing two or five seeds, and the outer skin is tough and indigestible, but it contains an acid which in cooking adds flavor.

Wild grapes are propagated by seeds, but the cultivated varieties are propagated by cuttings or graftings (See GRAFTING). The methods of propagation, pruning and cultivating vary in different regions. The grape is extensively cultivated in western Asia, the south of Europe and in certain portions of the United States, particularly in New Jersey, Delaware, New York, Ohio and Illinois in the eastern half of the country, and California in the western portion. The vine lives for a long time, and in favorable climates it

Grape Fruit

will produce for many years. The fruit is chiefly used for raisins and for the manufacture of wine, though most of the grapes grown in the United States east of the Mississippi River are placed on the market for table use.

The grape is supposed to be the oldest cultivated fruit, and it has been known to civilized nations from time immemorial. It is supposed that the Phoenicians introduced the plant into Europe, whence it spread to England. Grape culture in California was begun by the Spanish missionaries about 1771, and from this small beginning the industry there has attained its present proportions. See RAISINS; WINE.

Grapefruit, also called pomelo, a citrus fruit allied to the lemon and the orange, but called grapefruit because of its slightly grape-like taste and because the fruit grows in small clusters somewhat like bunches of grapes. All varieties were originally called shaddock, from a Captain Shaddock who found the fruit in the East



BRANCH WITH BUNCH OF GRAPEFRUIT

Indies and introduced it into England about 1810, but the term shaddock is now properly applied only to the long, pear-shaped kinds, while the grapefruit or pomelo should mean only the round and orange-shaped.

The fruit is a native of southeastern Asia, but is now widely grown in Florida and other tropical or semi-tropical regions. The average grapefruit of commerce weighs from eight ounces to a pound, but under favorable conditions the fruits frequently attain a weight of eight to twelve pounds. The pulp of the fruit resembles that of the orange, except that it is coarser. The juice is sour and a little bitter, but is very pleasing if a little sugar is added. Some varieties of the shaddock, however, are so acid that they are not edible; the natives in the West Indies

Grasses

and other regions use the juice for scrubbing floors because it drives away the insects. The commercial varieties have been greatly improved by grafting and crossbreeding. Florida produces each year about \$2,000,000 worth, over 95 per cent of the total for the United States, California producing nearly all the remainder.

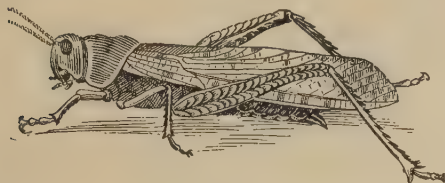
Graphite, *graf'ite*, one of the forms under which carbon occurs in nature, also known under the names of *plumbago* and *black lead*. It occurs frequently as a mineral production and is found in great purity in Borrowdale, in Cumberland, England, and in large quantities in Canada, Ceylon, Bohemia and at Ticonderoga, N. Y., where that of the purest quality is found. Graphite may be heated to any extent in close vessels without change; it is practically unchangeable in the air; it has an iron-gray color, metallic luster and granular texture, and it is soft and soapy to the touch. It is used chiefly in the manufacture of pencils, crucibles and portable furnaces; in burnishing iron to protect it from rust; for coating wax or other impressions of objects designed to be electrotyped, and for counteracting friction in machinery.

Grass'es, the common name of a very extensive and important family of plants, comprising about 250 genera and 4500 species, including many of the most valuable pasture plants, as well as corn, nearly all the grains, sugar cane, bamboo and many others. While technically all these plants belong to the grass family, yet the name is commonly applied only to the pasture grasses, as distinct from the cereals, and, moreover, to some plants which are not, in a strict sense, grasses. Most of the grasses are small herbs, with narrow sheathing leaves. The flowers, which are small, are never conspicuous, but they are often grouped in pretty and graceful clusters. The typical flower has three stamens, each with a long, delicate anther attached near the middle, so that it moves freely on its support, and a single pistil with a two- or three-branch stigma. These organs are surrounded by delicate bracts; several flowers are grouped into a spikelet, and these are in turn gathered into the racemes, panicles or heads which characterize the species. The fruit is a grain and usually is rich in food material. Most of the hay that is used is made from grasses, though clover and other plants are used for fodder. The direct and indirect products of the grass family are almost innumerable, and it is difficult to get an adequate idea of the great importance of this family. A great number of special articles will be found

Grasshopper

upon leading grasses, such as CORN; WHEAT; RYE.

Grass'hopper, the name of various leaping insects which are nearly related to the locusts. They are characterized by long and slender legs, the thighs of the hinder legs being large and adapted for leaping, by large and delicate wings and by the peculiar wing covers, which extend far beyond the extremity of the abdomen. Grasshoppers form an extensive group of insects and



GRASSHOPPER

are distinguished by the power which they possess of leaping to a considerable distance and by the chirping noise the males produce by rubbing their wing covers together. The destructive insect known as the grasshopper in the United States is the Rocky Mountain locust, and the "locust" of this country is really the cicada. See LOCUST; CICADA.

Grass Tree, the popular name of a genus of Australian plants of the lily family, having shrubby stems, with tufts of long, grass-like, wiry foliage, from the center of which arise the tall flower stalks. These sometimes reach the height of fifteen or twenty feet and bear dense cylindrical spikes of blossoms at their summit. The base of the leaves forms, when roasted, an agreeable article of diet, and the leaves themselves are used as fodder for all kinds of cattle.

Gratian, *grat'she an*, (359-383), Roman emperor, eldest son of the emperor Valentinian I. When only eight years of age he was raised by his father to the rank of Augustus. On the death of Valentinian, in 375, the Eastern Empire remained subject to Valens, and Gratian was obliged to share the western part with his half-brother, Valentinian II, then four years old. In 378, on the death of Valens, he succeeded to the Eastern Empire, which he bestowed on Theodosius I. He was deserted by his soldiers while leading them against Maximus, and was put to death at Lyons.

Grat'tan, HENRY (1746-1820), an Irish orator and statesman, educated at Trinity College and at the Middle Temple and called to the Irish bar in 1772. In 1775 he was elected member for Charlemont in the Parliament of Ireland.

Gravity

He brought forward resolutions asserting the Crown to be the only link between Britain and Ireland, and in 1782 he led the volunteer movement, which was instrumental in securing the concession of virtual independence to Ireland. In 1800 he strongly opposed the union with England, but on the passage of Pitt's measure he was returned to the imperial Parliament. He worked constantly for Catholic emancipation.

Gratz or **Graz**, *grah'ts*, a town of Austria-Hungary, capital of Styria, picturesquely situated on the Mur, about 140 mi. s. w. of Vienna. The Schlossberg, or citadel, rises 400 feet above the river, but the fortifications of the town have given place to avenues and pleasure grounds. The university, founded in 1586, has almost two thousand students and a library of over 150,000 volumes. The Joanneum, for the promotion of agriculture and scientific education, has a large library and museums. The manufactures consist of woolen, cotton and silk tissues, machinery, steel rails, wagons, soap, leather and ironware. Population in 1910, 151,781.

Graver. See BURIN

Grav'ita'tion, the attraction which exists between all bodies at sensible distances. The general law of gravitation, discovered by Newton, is that every portion of matter attracts every other portion of matter with a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them. *Gravity* denotes the attraction which the earth exerts on bodies on its surface. This attraction is least at the equator and greatest at the poles, since, owing to the form of the earth, bodies at the equator are a little farther from the center than at the poles. Furthermore, the rotation of the earth, being so rapid at the equator, has a tendency to throw bodies from the surface and thus to overcome in a measure the earth's attraction, while at the poles this tendency is not found. For the laws of gravity, see FALLING BODIES.

Gravity, **SPECIFIC**, the relative weight or density of substances. Specific gravity is found by comparing the weight of a substance with the weight of an equal quantity of some other substance, taken as a standard. Water forms this standard for liquids and solids, and air is the standard for gases. There are three general rules for finding the specific gravity of substances:

(1) *To find the specific gravity of a body heavier than water*, attach the body to one arm of a balance or to a spring balance and weigh it in air; then weigh it suspended in water. Its

loss of weight in water is equal to the weight of an equal volume of water. Subtract the weight in water from the weight in air and divide the weight in air by the difference. The result is the specific gravity.

(2) *To find the specific gravity of a body lighter than water*, weigh the body in air; then weigh a sinker in air, being sure that the sinker is heavy enough to immerse the light body. Weigh the sinker in water, and then weigh the two in water. From the loss of weight of the two bodies in water subtract the loss of weight of the sinker in water. The result will be the loss of the light body. Divide the weight of the light body by its loss of weight in water, and the result is the specific gravity.

(3) *To find the specific gravity of a liquid*, use a specific gravity bottle, which holds a certain weight of water, as a thousand grains. Divide the weight of the liquid which the bottle contains by the weight of the water, and the result is the specific gravity. The specific gravity of liquids may also be found by the use of the hydrometer (See HYDROMETER).

Gray, ASA (1810-1888), an American botanist, born at Paris, N. Y. After practicing medicine for some time, he became assistant to Professor Torrey in the New York College of Physicians and Surgeons. In 1842 he was appointed Fisher professor of natural history in Harvard University and held the chair for thirty-one years, when he retired from its more active duties. Gray was one of the ablest and the most philosophic of botanists and wrote many valuable books, among which are *Lessons in Botany*, *Elements of Botany*, *How Plants Grow*, besides other botanical text-books. He was one of the first American scientists to advocate the theory of evolution and set forth his theories in *Darwinia* and *Free Examination of Darwin's Treatise*. At the time of his death he was the leading American authority in the science of botany.

Gray, ELISHA (1835-1900), an American inventor, born at Barnesville, Ohio. He experimented in the construction of electrical machines and in 1867 took out his first patent. He applied, in 1876, for a patent on a telephone, which was refused on the ground that Alexander Graham Bell had applied for a patent on a similar invention on the same day and was adjudged to have a prior claim. For the next few years Gray was engaged in perfecting and patenting telegraph instruments and details of telegraphic structure. Among his inven-

tions were a system of multiplex telegraphy, a type-printing telegraph and the telautograph, a form of writing- or copying-telegraph. See TELEGRAPH; TELAUTOGRAPH.

Gray, GEORGE (1840-), an American jurist, born at New Castle, Del. He graduated at Princeton, studied law at Harvard and was admitted to the bar in 1863. He began practice at New Castle, but later removed to Wilmington. From 1879 to 1885 he was attorney-general of Delaware and in the latter year was elected United States senator as a Democrat, serving until 1899, when he was made judge of the United States circuit court. He was a member of the Spanish-American peace commission of 1898 and of the joint high commission between Canada and the United States in the same year. He was also chosen a member of the permanent court of arbitration of the Hague Convention in 1900 and was chairman of the anthracite coal strike commission in 1902.

Gray, JOHN PURDUE (1825-1886), an American physician, born in Pennsylvania, noted for his work among the insane, especially in the states of New York and Michigan. He was instrumental not only in securing better treatment for patients, but in the founding of many charitable institutions, including hospitals and asylums. He died from the effects of a wound received at the hands of a lunatic.

Gray, ROBERT (1757?-1806), an American naval officer and discoverer, born at Tiverton, R. I. In 1787 he commanded a vessel in an expedition to the northwestern coast of America and to China. Later he returned home by way of the Cape of Good Hope, being the first American to sail completely around the globe. Upon his discovery of the Columbia River in 1788 the American claim to the Oregon region was afterward based.

Gray, THOMAS (1716-1771), an English poet, born in London, educated at Eton and Cambridge. In 1738 he was entered at the Inner Temple, but accompanied Horace Walpole, a school friend, on a tour of Europe, until they quarreled in Italy. He returned to England in 1741 and on the death of his father took up his residence at Cambridge. In 1747 appeared his *Ode on a Distant Prospect of Eton College*, which won him a wide reputation, but it was not until the publication of his *Elegy Written in a Country Churchyard*, four years later, that he became famous. In 1757 he declined an offer of the laureateship, and in the same year he published his odes, *The Progress of Poesy* and *The Bard*.

Grayling

From 1768 to his death he was professor of modern history and languages. Among Gray's other works are *Ode for Music*, *Ode to Spring* and *Hymn to Adversity*. In Latin verse he is surpassed by few, and his letters are most admirable.

Gray'ling, a name given to a family of fishes related to the salmon. They are more slender, however, have larger scales and are more graceful and active, resembling the trout in their habits. Graylings are fine game fish, and their flesh is considered a great delicacy. The com-



GRAYLING

mon European species is found in Scandinavia, Russia, the Orkney Islands and as far south as Switzerland. The largest specimens weigh four or five pounds. In America, graylings weighing about a pound and a half are found in the clear, cold streams of Canada, Alaska, Michigan and Montana.

Graz, grahts. See GRATZ.

Great Bar'rington, MASS., a town in Berkshire co., 40 mi. w. of Holyoke, on the New York, New Haven & Hartford railroad. It is surrounded by picturesque mountain scenery and is a popular summer resort. There are manufactures of cotton goods, electrical apparatus, paper and other articles. The city has a public library, the Hopkins Memorial Manse and the Sedgwick Institute. It was settled in 1725, but remained a part of Sheffield until 1761. Population in 1910, 5926.

Great Bear Lake. See BEAR LAKE, GREAT.

Great Brit'ain, geographically, the largest island of Europe, consisting of the political divisions England, Scotland and Wales; officially, the United Kingdom of Great Britain and Ireland, and popularly, the term used for the British Empire. This article treats of the island Great Britain and the Empire as a whole. For detailed descriptions of surface, manufactures, cities and inhabitants, see ENGLAND; IRELAND; SCOTLAND; WALES. Great Britain lies between the 50th and 59th parallels of north latitude and is separated from Europe by the North Sea, the English Channel and the Strait of Dover. Its

Great Britain

greatest length from north to south is 608 miles. Its breadth varies from 32 miles, in the narrowest point, to 320, in the widest. The area of the island is 88,094 square miles, and of the United Kingdom, 121,000 square miles, or about three times that of the State of Ohio. The coast is very irregular and contains many deep indentations, so that the coast line exceeds 4000 miles in extent, or 1 mile for every 20 square miles of area.

SURFACE AND DRAINAGE. The surface of Great Britain is divided into four well-defined regions: (1) the highland region of the north, which is separated from the lowlands, to the southeast, by an irregular line, drawn from the mouth of the Clyde around Loch Lomond to the mouth of the Dee and separating the Grampian Mountains, which form the principal group in the highlands, from the South Grampians; (2) a region of lowlands to the southeast of this line, extending to the ranges of mountains in the southern portion of Scotland; (3) the mountain region, extending from the southern part of Scotland through the northern and western part of England and into Wales, this region containing a number of low mountain ranges, whose greatest height does not exceed 2600 feet, and one of which ranges, the Cheviot Hills, forms a large portion of the boundary between England and Scotland; (4) the lowlands or plains occupying the southeastern portion of the island and including the greater part of the surface of England. None of the mountains of Great Britain are high, and the highest peak, Ben Nevis, to the west of the center of Scotland, has an altitude of only 4406 feet.

Because of the area of the island and the numerous mountain ranges, none of the rivers are of great length or volume. The two largest streams are the Clyde and the Severn, each of which flows through a longitudinal valley for some distance before reaching the sea. Because of the basins drained, these streams acquire considerable volume. The most important rivers entering the sea upon the east are the Spey, the Don, the Dee, the Tay, the Forth, the Tweed, the Tyne, the Trent and the Thames. The last is commercially of great importance, since it has been made navigable by dredging and is the waterway which affords an outlet to the commerce of London. In the mountain regions in the north are numerous small, clear lakes, noted for their beauty and for the purity of their water. Among these are Loch Lomond, Loch Katrine and Loch Rannoch.

CLIMATE. If Great Britain were placed alongside of North America, in corresponding latitude, it would extend from the northern shore of the Gulf of Saint Lawrence almost to the southern extremity of Greenland; yet, notwithstanding its latitude, the island has a mild, temperate climate, the average temperature for the year being about 48°. July is the warmest month, with an average temperature in London of 64°, and January is the coldest month. During the summer the mean temperature varies considerably from north to south, being a number of degrees lower in northern Scotland than in southern England; but in winter the change in temperature occurs from east to west, the temperature rising as one proceeds westward. In general, the rainfall is heaviest on the west coast and on the islands lying to the west of the main island, where the average is about 40 inches per year, very uniformly distributed. In certain localities in Great Britain, especially the western slope of the Scottish highlands, it is nearly double this amount. In Wales and Cornwall it exceeds 60 inches, but along the east coast it seldom reaches 30 inches. The island is subject to dense fogs and many dull, cloudy days.

This peculiarity of climate is due to the influence of the warm waters in the Atlantic. The warm drift, which starts off the east coast of North America as the Gulf Stream (See GULF STREAM), raises the temperature of the air which strikes Great Britain as a southwest wind. Since this wind blows during the greater part of the year, it gives to the island a mild and equable climate. During the winter months the coldest weather is produced by the north and northeast winds, which at this season of the year are more frequent than at any other time.

VEGETATION AND ANIMALS. See EUROPE, subheads *Vegetation* and *Animal Life*.

INDUSTRIES. The chief industries of Great Britain are agriculture, manufacturing, mining and commerce. For each of these the island is especially adapted by its geographical conditions. The mild and equable climate, with abundance of moisture, affords excellent conditions for agriculture, and wherever the land is tillable this is practiced with greatest success. In the highland regions the raising of live stock constitutes an important industry. Iron and coal are found in the highland districts in large quantities, and it is to the presence of these minerals that Great Britain owes its prominence as a

manufacturing and commercial nation. Tin has been mined in Cornwall for centuries, and that locality is still an important source of supply. The leading industry is manufacturing. This employs a larger number of people than any of the other industries, and the value of its output exceeds that of any other. First in importance in manufactures are textiles, Great Britain being the leading country of the world in the production of cotton and woolen goods. Next in importance are iron and steel and all of the products arising from them. For detailed accounts, see ENGLAND and SCOTLAND, subheads *Agriculture* and *Manufactures*.

TRANSPORTATION AND COMMERCE. Throughout the island there are excellent highways. All of the principal towns are connected by railway lines, which are constructed and operated upon the most approved plans. The large cities contain street car lines, and in some localities these have been extended to connect neighboring towns. The island has over 3000 miles of canals, the most important of these being the Manchester Ship Canal and the Caledonian Canal, each of which is described under its title. Many of the rivers have also been canalized, so that they afford water communication between the inland towns and the sea. None of the manufacturing or commercial centers is more than 75 miles from the sea, and most of them are much nearer, while many are situated on waterways. These local advantages, combined with the extensive manufacturing industries and the position of Great Britain among the land masses of the world, have made her the foremost commercial and carrying nation. Trade has also been increased by the numerous colonies of the British Empire, with which special trade relations are maintained. The British merchant marine is the largest in the world, and carries not only the commerce of Great Britain but much of that of the United States and other nations as well (See MERCHANT MARINE). With the exception of the United States, no other country has ever risen to such commercial prominence as that held by Great Britain since the beginning of the eighteenth century. The exports consist almost entirely of manufactures, though coal is sent to other European countries. The imports consist of food products and raw materials. The annual foreign trade amounts to about \$6,650,000,000. Of this \$3,800,000,000 are imports and \$2,850,000,000 are exports. The leading countries engaged in the foreign trade, in the order

Great Britain

of their importance, are the United States, Germany, France and Russia. England early adopted the policy of free trade, that is, of admitting goods from foreign nations without duty, and she has always been the foremost advocate of this policy among the nations. See **TARIFF**.

The money system employed is based upon the pound sterling, which as a unit of value holds a position similar to that of the dollar in the United States. Its value in United States money is usually \$4.8665, but rates of exchange cause this to vary slightly from time to time.

RELIGION. The Church of England is the established church in England, and the Presbyterian, or Church of Scotland, in Scotland. All other religions, however, are tolerated without opposition, and the Roman Catholic Church and leading Protestant denominations have large followings. See **ENGLAND, CHURCH OF**.

EDUCATION. See **EDUCATION, NATIONAL SYSTEMS OF**, subhead *Great Britain*.

ARMY AND NAVY. See **ARMY**, subhead *British Army*; **NAVY**, subhead *Great Britain*.

THE EMPIRE. The British Empire is the largest in the world and includes over one-seventh of the land area and nearly one-fourth of the population of the earth. British possessions are found upon every continent and in every clime. The colonial policy of the government allows the greatest possible freedom to the inhabitants of these possessions; all of the leading colonies are self-governing, and such as Canada and Australia are practically independent (See **CANADA, DOMINION OF**; **AUSTRALIA, COMMONWEALTH OF**). The chief colonial possessions, with the area and population in 1911, are shown in the table on this page. Those of comparatively no importance are omitted, and the population of such colonies as British East Africa and others that are not well known is estimated.

GOVERNMENT. *Central.* The government of Great Britain is a constitutional hereditary monarchy. Its constitution, however, is not a single written instrument, but consists of all the laws of Parliament, all royal decrees establishing forms or principles of administration, a number of important agreements, several treaties, by which the relations of the parts of the United Kingdom to one another are regulated, and a vast mass of precedents and judicial decisions. Of all these, five instruments are, perhaps, of the greatest importance: the Magna Charta, given by King John in 1215; the

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GREAT BRITAIN AND ITS COLONIAL POSSESSIONS	AREA IN SQUARE MILES	POPULATION
IN EUROPE:		
United Kingdom.....	121,089	45,216,665
Isle of Man.....	227	52,034
Jersey and Guernsey.....	76	96,900
Gibraltar.....	2	24,460
Malta.....	117	228,442
IN ASIA:		
India (British and Native States).....	1,766,542	244,267,542
Ceylon.....	25,333	3,592,397
Cyprus.....	3,584	274,108
Hong Kong.....	32	366,145
Aden, Perim and Kuria Muria.....	101	46,165
Sokotra.....	1,382	12,000
Bahrein Islands.....	270	70,000
Borneo (British North).....	31,191	200,000
Labuan Island.....	31	6,546
Brunei.....	4,000	21,718
Sarawak.....	41,000	500,000
Straits Settlements (Singapore, Penang and Malacca).....	1,542	714,069
Federated Malay States (Perak, etc.).....	26,380	1,035,933
Wei-Hai-Wei (in Shantung).....	285	150,000
IN AFRICA:		
Ascension Island.....	35	400
Basutoland.....	10,293	405,600
Bechuanaland Protectorate.....	275,000	125,350
Cape of Good Hope.....	277,000	2,563,024
Central Africa Protectorate (British).....	40,980	1,000,000
East Africa (British, Uganda and Zanzibar).....	289,258	4,000,000
Mauritius and dependencies.....	877	400,000
Natal (including Zululand, Amatongland and other districts).....	35,371	1,191,958
Nigeria.....	310,000	17,000,000
Orange Free State.....	50,392	526,906
Rhodesia.....	750,000	1,700,000
Saint Helena.....	47	3,520
Seychelles.....	148	26,000
Somaliland Protectorate.....	60,000	300,000
Transvaal.....	111,196	1,676,611
West African Colonies (Gold Coast, Lagos, Gambia, Sierra Leone).....	138,260	1,716,000
IN AMERICA:		
Bermudas.....	18	18,994
Canada.....	3,729,665	7,204,527
Falkland Islands and South Georgia.....	7,500	2,272
Guiana (British).....	90,500	296,000
Honduras, British.....	7,562	40,458
Newfoundland.....	40,200	237,500
Labrador.....	120,000	4,000
WEST INDIES:		
Bahamas.....	5,450	55,944
Barbados.....	166	171,982
Jamaica and dependencies.....	4,424	831,383
Leeward Islands (Virgin Islands, etc.).....	701	127,189
Trinidad (including Tobago).....	1,868	330,074
Windward Islands.....	498	120,000
IN AUSTRALASIA:		
Australia, Commonwealth of.....	2,972,918	4,455,005
British New Guinea.....	90,540	271,000
New Zealand.....	104,751	1,008,468
Fiji.....	7,435	139,541
PACIFIC ISLANDS:		
Tonga, or Friendly Islands.....	390	23,737
Other Islands.....	9,000	200,000
Total.....	11,565,642*	345,048,567

* This is considerably less than the actual total, owing to the omission of many minor possessions, and the conservative areas given for unsurveyed African territories.

Declaration of Rights in 1689; the Act of Settlement in 1701; the Act of Union with Scotland in 1707; the Act of Union with Ireland in 1800. The constitution obviously may be changed in a great number of ways; and, in fact, it is constantly changing.

The *executive* power is nominally vested in the Crown. This descends to the eldest child of the preceding ruler, male heirs being preferred over female heirs. The heir to the throne is admitted to full possession of his titles at the age of eighteen, when he becomes, by heredity, duke of Cornwall, and by grant, prince of Wales. The ruler must be a communicant of the Established, or Episcopal, Church. The Crown has all powers not expressly forbidden to it by Parliament. Thus, it may declare war, make treaties and appoint and remove a vast number of administrative officers; it has command of the army, with the power of appointment and removal, is the nominal head of the Church, and presides over the highest ecclesiastical bodies, has the power of granting pardon and of issuing passports. The ruler may also summon, open, prorogue and dissolve Parliament, though the last step is never taken except with the advice of his ministry. He also has the nominal power of vetoing the legislation of Parliament, but this right has not been used since 1707. Since the fundamental doctrine of sovereignty prevailing in Great Britain is that "the king can do no wrong," he is made absolutely irresponsible; therefore, he acts invariably through a ministry, which is directly responsible to Parliament.

The *ministry*, known as the *cabinet*, is entirely an extra-legal body, but it is, nevertheless, the most important factor in the government. It is formed as follows: The king asks the leader of the majority party in the house of Commons to become premier and to select a ministry. This leader, after consultation with his party colleagues, names a number of them whom he wishes to be appointed to the important cabinet positions. The king promptly appoints them. The members of this ministry may be members of either house of Parliament, but if they have seats in the House of Commons they must resign and come before their constituents for reelection; however, this is usually a mere formality. The members of the ministry not only have seats in Parliament, with full privileges, but they initiate practically every important measure of legislation and lead in the debates. If defeated on an important policy, the cabinet resigns.

If the members believe that the people will uphold them, they may request the king to order a new election; if defeated by the electorate, however, they must resign unconditionally. The members of the cabinet vary from eleven to twenty. Each member is at the head of an important administrative department. The eleven officers who are always members of the cabinet are the first lord of the treasury (usually the prime minister); the chancellor of the exchequer (the highest financial officer of the government); the lord chancellor (a judicial officer whose functions will be enumerated later); the lord president of the council (who is the presiding officer of the privy council); the lord privy seal (whose only duty is to affix the great seal of state to public documents); the first lord of the admiralty (who is at the head of the naval board) and the five secretaries of state—for foreign affairs, for the colonies, for war, for the home department and for India. Besides these, the following are often members of the cabinet, as at present: the chief secretary of Ireland, the secretary for Scotland, the president of the local government board, the commissioner of works, the president of the board of trade (which has charge of the public telegraph and commercial business, as well as the postoffice), the president of the board of agriculture, the postmaster-general, the attorney general and the chancellor of the duchy of Lancaster. The heads of departments may take the most important steps without consulting Parliament. Parliament may punish them for their acts, but it has no power to restrain them from doing whatever they see fit.

The *legislative* branch of the government consists of two houses, the House of Lords and the House of Commons. Their powers are about equal, except that all bills relating to taxation and appropriations must originate in the House of Commons; and every law requires the assent of both. The Parliament Act of 1911, however, provided that a bill which has passed, without change, three readings in three successive sessions of the Commons may become a law without the assent of the Lords. Each term of Parliament extends over five years, unless the body is sooner dissolved. The upper house consists of representatives of two estates, the lords spiritual and the lords temporal. Of the former, the archbishops of Canterbury and of York and twenty-four principal bishops are admitted. Of the lords temporal, there are about five hundred hereditary English peers, which have

been created by the Crown. This number may be increased without limit by the sovereign. Besides these there are sixteen Scottish peers, chosen by the whole body of Scottish peers to represent them during a term of Parliament, and twenty-eight Irish peers, chosen for life, by the whole body of Irish peers. There are also four judicial members, chosen from the privy council. The whole body is presided over by the lord high chancellor. The House of Commons consists of 670 members, chosen by a suffrage limited to male citizens who are twenty-one years of age or over and who possess a property qualification. Members of the House of Commons are chosen by districts, one representative being admitted for each 54,000 inhabitants. There are also a few representatives of towns and of the great universities. Members of Parliament need not be residents of the districts from which they are elected.

The House of Lords is the highest *judicial* body in the United Kingdom. It not only has original jurisdiction in certain instances, but it is the highest court of appeal for England, Scotland and Ireland. In hearing appeals, however, only the lord chancellor, the four judicial members and other members who have held high judicial positions are allowed to take part. There is also a judicial committee of the privy council, consisting, however, of about the same personnel as the House of Lords when sitting as a court of appeal. This committee hears appeals from the colonies and possessions. Besides these two courts, there is a high court of justice, which consists of three divisions, the chancery division, the king's bench division and the probate, divorce and admiralty division. Appeals lie from this court to a court of appeals consisting of eight judges. Criminal cases are within the jurisdiction of the justices of the peace and of so-called assize courts, held quarterly in certain towns by judges of the king's bench.

Local. Local government in England is extremely complex and in many respects unsystematic. By the acts of 1888 and 1894, however, the system has been somewhat simplified. There are six administrative units, namely, counties, boroughs, urban districts, rural districts, parishes and school districts. The officers of the *county* are a lord lieutenant, a sheriff, justices of the peace, a clerk and a coroner. The lord lieutenant represents the Crown; the sheriff and justices of the peace have duties similar to those of the same officers in the United States. How-

ever, the justices also have a few administrative duties, such as the issuance of licenses and appointing overseers of the poor. Each county also has a county council, consisting of councilors and aldermen, the latter being selected by the former, usually from their own members. This body administers county property, selects minor officers, assesses taxes, manages roads, grants amusement licenses, controls the police and has other administrative duties. The counties are subdivided into *rural* and *urban districts*, each governed by a council elected by the assemblies of still smaller districts, or parishes, and has administration of the poor laws, health laws and some other ordinances. The *parish* is governed by an assembly at which every voter and married woman has the right to vote. A rural parish having more than three hundred population also has a council, which has charge of charities, water supply and similar matters. The *borough* is an incorporated town; its officers are a mayor, aldermen and councilors, which together form the council. The councilors are elected by the taxpayers; the aldermen by the councilors, and the mayor by the whole council. The duties of these officers include all the important administrative functions. *London* is governed by a special provision of the Act of 1888, amended in 1901, by which it was made into an administrative county, containing 29 boroughs, each having the same officers as other boroughs (See LONDON). All phases of local government are supervised by a local government board, whose president is a member of the cabinet. It audits the accounts of all local authorities, institutes important local legislation and directs in a large measure the activities of local affairs.

Administration in Scotland, Wales and Ireland. The administration of government affairs in Scotland is conducted through the chief secretary for Scotland, who is usually a member of the cabinet. The country is represented in the Parliament of Great Britain by 16 peers and 72 commoners. In local government it conforms to the laws that are in force in England (See above). It has a separate system of civil and criminal courts, though an appeal to the House of Lords, the highest court in the United Kingdom, may always be taken.

Until the passage of the Government of Ireland Bill in 1914, Ireland was governed through a lord lieutenant and a privy council. The former was and still remains a personal representative of the Crown; he was always dependent upon, though nominally superior to, the chief secretary for

Ireland. The law of 1914 provides for an Irish parliament, besides allowing Ireland a small representation in the imperial parliament. It provides a separate system of courts, of which the highest is the supreme court of judicature; from this an appeal lies to the House of Lords of the United Kingdom. Local government is administered in accordance with a special act passed in 1898, but it generally conforms to the English system. All local government is supervised by a local government board, appointed by the lord lieutenant. See HOME RULE.

Wales since 1536 has been governed as a part of England, its inhabitants having all the rights and privileges of English subjects.

Colonial Administration. The colonies and dependencies which are united under the crown of Great Britain all are subject to the imperial Parliament. The *first* class comprises those which are practically independent of Great Britain, having their own legislature and judiciary and being subject to the crown only through its representatives, or governors, and through its nominal right to veto legislation. This right is used, in fact, only in rare cases, in matters affecting the Empire as a whole. Such colonies are Canada, Newfoundland, Australia and South Africa. The *second* class comprises the semi-independent colonies, in which the legislature is partly elective and partly appointed by representatives of the Crown, and in which the royal governor has greater influence. Such are Malta, Cyprus, Ceylon, Jamaica and others. The *third* class are the strictly-called Crown colonies, which are ruled entirely by a governor and council appointed by the Crown. This class includes the Empire of India, Gibraltar, the Straits Settlements, Orange River Colony, Transvaal, Gold Coast, British Honduras and others. The *fourth* class embraces the protectorates, that is, those colonies in which the government is conducted through native agencies. In point of fact, these are governed almost as completely by Great Britain as are the Crown colonies. The *fifth* class was formerly much more important than at present, comprising those colonies governed through trading companies by charters. Another class might with some justice be constituted, to include such territories as Egypt, where, though the government is nominally administered by another power (Turkey), British influence is so paramount that the country is practically a British dependency. (For details concerning the governments of the important colonies, see articles under their titles.)

FINANCE. The ordinary sources of revenue of Great Britain are seven in number, being, in the order of the amounts produced, as follows: excise duties, customs duties, income tax, inheritance tax, or so-called death duties, stamp duties, house duties and land tax. For a half century the tendency of British financial legislation has been towards free trade, though the fiscal system still retains the protective principle, inasmuch as duties are laid upon many manufactured products of which the raw materials are admitted free. They are chiefly, however, levied upon products not produced in England, such as tea, tobacco and sugar. The income tax is levied in graduated rates upon all incomes over £160; it constituted about one-sixth of the total revenue in 1911. The house duty is levied according to the rental value of the property, houses producing less than £20 annual rent being exempt. Local taxes are assessed by several boards, including the county councils and the school boards, and they are usually levied upon all property. The chief expenditures of the Empire are for the following purposes, the list being given in the order of the amounts required: the navy; interest upon the national debt; the army; the civil service; elementary education; contributions to supplement local taxation; the royal civil list, that is, the expenses and bounties for the royal family, and the collection of taxes. The national debt in 1911 amounted to £733,072,610 (\$3,665,000,000), requiring an annual payment of interest of £28,000,000 (\$136,200,000). The government owns the telegraph lines, the income from which is usually a trifle more than the expenditure; but from the postal service, which includes a parcel post, the government derives a net income of from four to five million pounds annually.

HISTORY. Although with the accession of James VI of Scotland to the throne of England as James I, in 1603, the crowns of the two countries had been united, each had retained its own legislative body; but by 1707 the feeling had grown strong that the best interests of the two countries demanded a complete political union. In May of that year, therefore, they were united under the name of Great Britain. (For the history of the two countries previous to the union, see ENGLAND, subhead *History*; SCOTLAND, subhead *History*.) For a time the union was not generally popular in Scotland, but gradually the realization grew that it was the best thing which could have happened.

Queen Anne died in 1714 and was succeeded

by George I of the House of Hanover (See **GEORGE I**). Soon after his accession, risings occurred in the interests of the exiled Stuarts, whose cause the Tories had advocated with Anne, and the new Parliament found itself obliged to punish severely the leaders of these insurrections, which were easily put down. The Whig party, which came in with George, remained in power for almost fifty years. One of the first acts of the new Parliament was the passage of the Septennial Act, by which Parliament extended the term of its members in office to seven years. This arbitrary act was made possible by the fact that George I cared little for his English possessions, provided only the English were willing to support him in his plans on the Continent. This same indifference rendered possible the establishment of the first real cabinet government under a prime minister. Walpole, although he did not assume the title, was in reality the first of the premiers. In 1720 occurred the disastrous failure of the famous South Sea Company, which involved thousands in its ruin and greatly embarrassed the British government. Walpole's signal financial ability worked some sort of order in this crisis, however (See **SOUTH SEA COMPANY**; **WALPOLE, ROBERT**).

George I died in 1727 and was succeeded by his son, George II. Walpole retained his supremacy, since George II, like his father, took no vital interest in affairs in England. Against his will Walpole was drawn by popular feeling in 1739 into a war with Spain, which brought no honor to England and much unjust blame to him. Three years later, however, he resigned rather than engage in the War of the Austrian Succession. His successor, Carteret, at once involved the country in the war, and, although Great Britain won some victories, she came out of the struggle with no permanent advantages. During this war another Stuart rising had occurred, headed by Charles Edward, known as the Young Pretender, and this proved more formidable than the earlier attempts. Charles Edward was defeated, however, at Culloden and was forced to flee from the country. William Pitt entered the cabinet in 1756, and his hostility to France led him to engage at once in the war against France which ended so fortunately for England in India and in America (See **CLIVE, ROBERT**; **SEVEN YEARS' WAR**; **FRENCH AND INDIAN WARS**). For further events in the reign of George II, see **GEORGE II**; **PITT, WILLIAM**).

Meanwhile, before the close of the struggle with France, George II had died (1760) and had

been succeeded by his grandson, George III. The new king adopted a different attitude toward English affairs and showed himself from the first determined to regain the royal prerogatives which had been lost by his two predecessors. As before the days of Walpole, the most important man in the cabinet became the man who happened to be the greatest favorite with the king (See **GEORGE III**); and Pitt resigned in 1761 and was succeeded by Bute, who in his turn gave place to North. During the North ministry, matters in America came to a crisis, and the result was the loss to England of much of her territory in North America (See **NORTH, FREDERICK, Lord**; **REVOLUTIONARY WAR IN AMERICA**). In the year which saw the close of this struggle (1783), the Younger Pitt was made prime minister, and until his death in 1806 he was at the head of affairs in England. In 1793 he declared war against France, not because of any harm which had been done to England, but simply because of his opposition to the fanatic republicanism of the French Revolution, and this war was prosecuted vigorously. The victory of Trafalgar (See **NELSON, HORATIO**) established the English supremacy on the sea, and Wellington's defeat of the French in Spain and Portugal enabled England to obtain favorable terms for herself at the Congress of Vienna.

During the war with France there had been an insurrection in Ireland, which was put down without great difficulty, and a war with the United States (See **WAR OF 1812**), which had ended somewhat less favorably than the struggle with France. These wars had increased enormously the national debt of England, and the distress was great among the lower classes. Most severe measures were taken to suppress the discontent of the working classes, but by the time of the death of George III in 1820 it had become apparent that matters could not be amended without radical governmental reforms. Thus, when in 1822 George Canning became a member of the cabinet of George IV as foreign minister, he turned his attention at once to reform and succeeded in carrying through several minor measures which improved the conditions of the country. He was made premier in 1827, but died soon afterward and was succeeded by Wellington. Wellington, although a Tory, carried on the reform movement, and in 1828 the Test Act was repealed (See **RUSSELL, LORD JOHN**). As a result of the Irish agitation under O'Connell in the following year, the ministry was also forced to agree to Catholic emancipa-

tion. William IV, when he came to the throne in 1830, found himself confronted with the necessity for further reforms, and two years later he was compelled by Grey to agree to the creation of a number of peers, to make possible the passage of the Great Reform Bill of 1832 (See GREY, CHARLES). The next noteworthy measure was the abolition of slavery in the colonies in 1833.

In 1837 Victoria succeeded to the throne. During her reign matters remained largely in the hands of the ministry, and the sovereign exercised little real political influence. (See VICTORIA, and the articles on the statesman mentioned in that article; also BRIGHT, JOHN, and COBDEN, RICHARD.) A distinctive achievement of her reign was the suppression of the Sepoy mutiny of 1857, which ended in the transfer of the authority in India from the East India Company to the crown. The question of home rule for Ireland, the federation of the Australian colonies and the war against the Boers are also noteworthy.

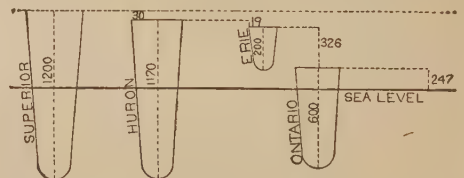
The reign of Edward VII (1901-1910) was marked by the king's activity in political affairs, both at home and abroad, by the close of the war in South Africa and by the growth of a strong feeling of loyalty throughout the British Empire (See CHAMBERLAIN, JOSEPH; EDWARD VII; SOUTH AFRICAN WAR; TRANSVAAL COLONY). The political situation in England was complicated by the refusal of the House of Lords to pass the budget of 1909, providing for a greatly increased tax on land. The unexpected death of King Edward on May 6, 1910, caused a truce, which was brought to a close by the final passing of the bill, the new king, George V, giving it his approval. The most momentous legislation since the Reform Bill of 1832 was passed in 1911—the so-called Veto Bill, which denied the House of Lords the right to amend or reject any financial bill and provided that any bill which has been passed three times by the House of Commons in three successive years and three times rejected by the House of Lords may become a law without the approval of the Lords. The reign of King George was marked by the Imperial Conference of 1911, in which statesmen from the colonies met with those of Great Britain to discuss matters relating to the whole empire; the passage of an act providing for government insurance against sickness and unemployment; strikes and disturbances among the laboring classes; the disestablishment of the Welsh church, and the passage of the Home Rule Bill (See HOME RULE).

In 1914 Great Britain declared war against Germany, because of that country's violation of Belgian neutrality. See AUSTRIA-HUNGARY, subhead HISTORY; WAR OF THE NATIONS.

Great Falls, MONT., the county-seat of Cascade co., 98 mi. n. e. of Helena, on the Missouri River and the Great Northern and other railroads. Gold, silver, copper, lead, iron and coal are found in the vicinity, and there are large smelting works. The important manufactures are flour, furniture, woolens, mining and agricultural implements. Population in 1910, 13,948.

Great Kanawha, *ka naw'wah*, a river of West Virginia, which rises between the Blue Ridge and Iron Mountains in North Carolina. It flows in a northeasterly direction, as the New River, through the western part of Virginia, and then, flowing to the northwest, traverses several ridges of the Alleghanies. The Gauley River flows into the Great Kanawha in Fayette County, West Virginia. The total length of the Great Kanawha is 400 miles, and it is navigable up to the Kanawha Falls, a distance of about 100 miles.

Great Lakes, THE, several vast inland bodies of water in the northern part of the United States, comprising Lake Superior, Lake Michigan, Lake Huron, Lake Erie and Lake Ontario. Lake Superior has an elevation of 600 feet above sea



level, while the elevation of Lake Ontario is only 247 feet. The fall of Lake Superior to Lake Huron is about 30 feet; of Lake Huron to Lake Erie, about 19 feet, and of Lake Erie to Lake Ontario, 326 feet. The accompanying diagram shows the relative position and altitude of the four lakes which form a continuous chain, their depth and their height above sea level. The level of Lake Michigan is about the same as that of Lake Huron. No large river flows into the Great Lakes. The Saint Lawrence River is the outlet. These inland seas constitute the largest body of fresh water in the world, covering an area of over 94,500 square miles, exceeding the combined area of Illinois and Indiana, and almost equalling that of Oregon.

The Great Lakes are the key to the modern industrial and commercial progress of the United States. More than half of the vessels registered

in the United States are found upon the Great Lakes. On their shores are the richest farms, forests and mines in the country, and in the southern and western region of Lake Superior there are valuable mines of iron ore. There are twenty ports on the Great Lakes, the most important of which are Duluth, Milwaukee, Chicago, Detroit, Toledo, Cleveland and Buffalo.

The lake and river routes are extended greatly by means of canals, first of which is the Erie Canal, from Buffalo to Albany in New York (See **ERIE CANAL**). The Sault Sainte Marie is another canal of importance. This canal allows boats to pass from Lake Superior into Saint Mary's River and thus connects with the lower lakes (See **SAULT SAINTE MARIE CANAL**). Other canals are the Welland, which connects Lake Erie with Lake Ontario and passes around the falls in the Niagara River (See **WELLAND CANAL**), and the system of canals around the rapids in the Saint Lawrence. Canals have also been constructed connecting Lake Erie with the Wabash and Ohio rivers, passing through the State of Ohio by way of Columbus and Cincinnati.

The Great Lakes are valuable for their fisheries, which amount to almost \$4,500,000 every year, herring, white fish and trout being the leading species. For further information on the Great Lakes, see separate article on each lake.

Great Pedee River, a name applied to the Yadkin River after it enters South Carolina. It rises in North Carolina in the Blue Ridge and flows in a southeasterly direction. Its affluents are the Little Pedee and Waccamaw, and it flows into the Winyaw Bay at Georgetown.

Great Salt Lake, a lake in Utah, 4000 feet above sea level. It is 70 miles long and 48 miles wide. Five gallons of its water yield, by evaporation, fourteen pints of salt. It has several islands, which, like its shores, are whitened by the salt. The chief tributaries are the Bear, the Jordan and the Weber rivers. This lake contains no fish, but has several species of insects and a brine shrimp, and it is frequented by immense flocks of gulls, ducks, geese and swans.

Great Slave Lake, an extensive lake in Canada, in the Territory of Mackenzie. It is about 300 miles long and 50 miles wide. On the north are rugged and steep shores, and in the lake are many islands. It receives the surplus waters of lakes Aylmer and Artillery, on the north, and those of Lake Athabasca, by way of the Great Slave River, on the south.

Great Wall of China, the largest artificial structure on the face of the earth, constituting

the most extensive fortification in the world. It extends for about 1255 miles along the north limit of China proper, of which it partly forms the boundary, and varies from 20 to 25 feet in width. Its western end is in the deserts of Central Asia; its eastern end reaches the sea, northeast of Peking. The wall is thick enough for six horsemen to ride abreast over it. It is built of hewn stone or brick, filled in between with earth. It is said to have taken several million men ten years to complete it. It was erected as a barrier against the inroads of the barbarous tribes during the reign of Emperor Shi-Hwang-Ti, and it is supposed to have been completed about 210 B. C.

Grobe, *grebe*, a water bird whose feet are not webbed, but whose toes are bordered by a wide membrane. The legs are thin, flat and blade-like. When the birds are on land, they sit erect and are exceedingly awkward and unwieldy in their movements, but in the water they are excellent swimmers and divers and are very graceful. There are nine species known in the United States, of which the common grebe, or, as it is sometimes called, the *hell diver*, is the most common. The *crested grebe* is a larger bird, having beautiful silvery breast plumage. Unfortunately, this fine, close, silky plumage became fashionable for muffs and trimmings, and so many of the birds are killed every year to satisfy the demands of women that there is danger that the species will become extinct.

Greece, *grees*, a kingdom which occupies the southern part of the most eastern peninsula of Europe. It lies between the Aegean and the Ionian seas and between 40° and 36° 23' north latitude. Its greatest length is about 250 mi., its greatest width about 180 mi., and the total area, including the islands in the Aegean and Ionian seas, is about 25,014 sq. mi. The entire country may be divided into three parts: Northern Greece, or Epirus and Thessaly, which forms the most compact land mass; Central Greece, and the southern peninsula, called the Peloponnesus, which is connected with Central Greece only by the narrow Isthmus of Corinth.

SURFACE AND DRAINAGE. Considering the size of the peninsula, Greece has a very extensive coast line, on account of its numerous bays and gulfs. On the north, it is protected by the Cambunian Mountains, a range running from east to west. The eastern extremity of this range is the celebrated Olympus, supposed in

ancient mythology to be the dwelling place of the gods. The Pindus Mountains, which divide Greece into a large western and a smaller eastern portion, as far south as the Gulf of Corinth, form the principal water divide. Thessaly is separated from the rest of Greece by Mount Oeta, which protected Middle Greece from invasion as long as the few mountain passes were well guarded. The mountains of Greece which have special historical associations are Olympus, which has already been mentioned; Parnassus, which is sixteen miles north of Corinth and was the fabled home of the Muses; Ossa and Pelion, south of Olympus near the coast, and Hymettus and Pentelicus, near Athens, the former noted for its honey, the latter for its marble quarries. The Peloponnesus is broken up by chains of mountains which spread out in all directions from the central state of Arcadia. The mountainous character of the country had a strong influence on its history, as it tended to keep the states separate and prevented the formation of a central government.

The rivers of Greece, on account of the peculiar formation of the surface of the country, are of little importance. Most of them have short courses and rapid falls and are therefore not navigable. Many of them dry up in the summer and form rushing brooks in the winter. The most important of the rivers are the Achelous and, in the Peloponnesus, the Alpheus and the Iri (Eurotas). Lakes are numerous in the mountain regions. The numerous islands by which Greece is surrounded belong to it by virtue of their physical and geographical structure. They are all mountainous and were probably at one time part of the mainland, Euboea appearing to be but a prolongation of the mountainous coast of Thessaly.

CLIMATE. The climate of Greece is in the main temperate and healthy, although it varies so greatly in different parts of the country that it is almost impossible to make any general statement regarding it. For example, at the same season of the year, at points not widely separated, may be found the heat of summer, the warmth of spring and the severity of winter. As in many other Mediterranean countries, the sirocco has a most unfortunate effect on the climate at certain seasons of the year (See **SIROCCO**). Apparently, in ancient times Greece was more healthful than it is to-day.

MINERAL RESOURCES. The minerals of Greece are neither numerous nor of great importance. The fact that there is no coal

interferes with the working of the copper and iron fields, but considerable lead is mined each year. Sulphur is found in some of the volcanic islands, and gypsum and salt appear in a number of localities. Paros and Pentelicus have long been famous for their marbles.

INDUSTRIES. The soil of Greece is thin, and agriculture is consequently backward, only about one-seventh of the area of the country being under cultivation. Irrigation is necessary to the production of good crops in almost all parts of the country. The vegetable products vary greatly with different localities, but a large part of the tilled land is given up to cereals. Despite this fact, however, Greece does not produce enough wheat for home use. The currant, a small seedless grape, which is grown largely on some of the islands in the Ionian Sea, is one of the largest and most important crops. Vineyards are numerous, but the wine produced is of poor quality.

The manufactures are unimportant. Woolens, chemicals, silks, cotton, pottery, soaps and leather goods are produced in sufficient quantities for home use, and shipbuilding is carried on at the seaports.

TRANSPORTATION. The position of Greece, together with its numerous bays and islands, has made of the Greeks at all times a seafaring people. The grain trade of the Black Sea and the Mediterranean Sea is almost all carried on by Greek merchants, and hundreds of vessels are employed for commercial purposes. The canal across the Isthmus of Corinth, completed in 1893, is a most important feature in Greek commercial life. The railroads of the country are not yet adequate to the demands upon them, as in 1900 there were only 603 miles in operation. There is in process of construction, however, a railroad between Athens and northern Thessaly, which will form the center of the transportation system of the country. Until comparatively recent times there were very few roads which could be used for carriages, but the means of communication have been greatly improved, and there are now over 2000 miles of good roads.

INHABITANTS AND LANGUAGE. Of the population of Greece, about nine-tenths are Greeks, the remainder being largely Albanians. Only about one-third of the Greek people live in Greece itself, and Turkey has almost as many Greek inhabitants as has the Greek kingdom. The language spoken is largely the modern Greek, which bears a very close resemblance to clas-

sical Greek, differing in fact from the Attic little more than the classical Attic and Doric dialects differed from each other. See GREEK LANGUAGE.

EDUCATION. For the early systems of education employed in Greece, see EDUCATION, HISTORY OF, subhead *The Ancient Classic Nations*. A modern law in Greece requires all children between five and twelve to attend school, but this law is by no means universally enforced, and illiteracy is very common, especially in the rural districts. From the primary schools to the university, all institutions of learning are free. The University of Athens is the chief higher institution of learning, and it had in 1900 almost 3000 students.

LITERATURE. See LITERATURE, subhead *Greek Literature*.

ART AND ARCHITECTURE. See PAINTING, subhead *Ancient Period*; SCULPTURE, subhead *Greece*; ARCHITECTURE, subhead *Greek Architecture*.

GOVERNMENT AND RELIGION. The government of Greece is an hereditary constitutional monarchy. Originally there were two houses in the Greek legislature, a Senate and a House of Representatives, but on the accession of George I, in 1864, the Senate was abolished, and the sole legislative power now rests with the House of Representatives, which is known as the *Boule*. Suffrage is universal, and elections are by ballot. A ministry, consisting of the heads of the six departments of state, exercises under the king the executive functions.

The predominant religion is the orthodox Greek faith, and nine-tenths of the people are of this religion. The king is required, unless a special exception is made, to be a member of this Church, and he is recognized as its temporal head. The affairs of the Church are managed by a permanent synod, which meets at Athens.

CITIES. The chief cities of Greece are Athens, the capital; Piræus, the port of Athens; Patras, and Corfu, each of which is described under its title.

HISTORY. When Greek history begins, both coasts of the Aegean are occupied by Indo-Germanic peoples. The Greeks themselves did not know much about the relations of their ancestors with the original inhabitants of Greece. The people who were thought by the Greeks to have been the original inhabitants were called Pelasgians. However, they were as good Greeks as the Greeks proper. They had lived originally in Thessaly, where they were in constant

warfare with their neighbors, the Hellenes, and when the latter came into Greece, they called all tribes who could not account for their ancestors, Pelasgians. So far as we know, the Greeks were the first inhabitants of the land of Greece. Much light has been thrown, of late, on the so-called Heroic Age, by excavations, chiefly at Mycenæ, Troy and cities on the island of Crete. These cities seem to have been the centers of an advanced civilization, and as Mycenæ was the chief center the period has been given the name of the Mycenaean Age.

The period from about 1200 to 700 B. C. corresponds in the history of Greece to the Middle Ages in later European history, in that it lay between two periods of culture and prosperity. Events of this period are best explained on the basis of the so-called Dorian migration, although some historians treat the history of Greece without reference to any such migration. The Dorians themselves were conscious of being conquerors in the land in which they dwelt, and the fact that the great epic poems did not mention the Dorians shows that the authors of such poems must have known that the Dorians were newcomers. Legends represent the Dorians as coming from Epirus. They were, on entering the Peloponnesus, ruder and more warlike than the earlier inhabitants of the Peloponnesus, and their settlements in the most civilized parts of the ancient Mycenaean kingdom completely overthrew the earlier civilization. The Dorian dialect supplanted the native language, but the newcomers accepted largely the gods and the sanctuaries of their predecessors. This migration cannot have been later than 1000 B. C.

During the Mycenaean Age Greece had been largely affected by Oriental influences; during the Greek middle age, on the other hand, the land was left largely to itself. When the Dorians first settled down in the Peloponnesus, the largest and most important political division of the people was the tribe—the assembly of free-men for war. At the head was the tribal king, with elders. The State was not conceived of as existing for the protection of the individual, who was considered a nobody, except when he interfered with the tribe. Custom was the binding power, and there was no such thing as law. Gradually, after the settlements, the notion of private property appeared, and from this grew the beginnings of differences in rank. The men who had gained the largest tracts of land became more powerful and at length took titles,

In Sparta, however, old conditions survived longer than in any other place, and there was no aristocracy there. The development of the city-state was another important effect of the settlement. This organization spread over all Greece and came to be the determining factor in Greek history. In some cases the old tribal king became a local king, but his power was lessened as different officials were elected to assist him and as the council gradually assumed more of his functions.

During the Greek middle age the most important states were those on the coasts of Greece and Asia Minor and those on the islands between. In Asia Minor the leading city was Miletus, while in Greece proper the foremost cities were Euboea, Chalcis and Eretria. A distinct colonizing impulse appeared in Greece from the eighth to the sixth centuries B. C., and numerous trading stations were established, chief among which were Syracuse in Sicily, Tarentum in Italy, Corcyra in the Adriatic, Massilia (Marseilles) in Gaul, Cyrene in Africa and Byzantium on the Bosphorus.

Although during this period, as well as during later periods, the Greek communities were practically independent, there were unifying influences which the people were prompt to recognize as soon as any danger from without threatened them. Sparta, in the Peloponnesus, was developing unity by her conquests, and the epic poetry which dealt with the former glory of Greece was a strong unifying force.

The third period of Greek history, from 700 to 500 B. C., may be known as the age of class struggles and adjustments. In the seventh and eighth centuries the Ionian cities took the lead in Greek civilization. They were the first to be strongly affected by commercial and colonizing activities, and they brought the Greeks of the mainland into closer relations with the Orient. During this period the chief bond of union between the Greek states was commerce, and not the idea of blood relationship, which had been strongest in the earlier period. Leagues based upon commercial interests were formed between states, and commercial quarrels were pursued regardless of blood ties. Meanwhile, the middle class came forward and demanded many privileges which had before belonged exclusively to the aristocracy. The individual, too, began to demand rights, and general dissatisfaction arose with the old laws. To satisfy new conditions in each district, lawgivers were appointed, who possessed the powers of dictators and were

empowered to draw up a code of laws. Among these lawgivers the most famous were Lycurgus of Sparta and Solon of Athens (See LYCURGUS; SOLON). The most important result of this new system of laws was that the people now knew what the laws were and could fix the responsibility for crime and injustice. Thus successful in their first opposition to the aristocracy, the people put forth a strenuous effort to overthrow completely the aristocratic government. Here and there men of genius or ability put themselves at the head of the revolutionary movements and gained unlimited power. These men were called tyrants, and they were practically kings, although in most cases they enjoyed larger power than the earlier kings had done.

In the fifth century B. C. a common danger drew the Greek states closer together than they had been before. The Ionian cities had been conquered in the sixth century by the king of Persia, and when in 500 B. C. some of the cities revolted against the Persians, the Athenians sent ships to assist them. The Athenians met with some successes, but were finally completely defeated by the Persians in a battle near Ephesus. Darius, the Persian king, was enraged by the share which the Athenians had taken in this revolt, and in 492 B. C. he dispatched Mardonius, his son-in-law, into Greece to punish the Athenians. A storm off Mount Athos destroyed a large part of the Persian fleet, and the army of Mardonius suffered so severely from the attacks of the Thracians in his march through the country that he retreated to Asia. Darius, however, was still unappeased, and two years later he sent another force into Greece, which was completely defeated by a band of Athenians and Plataeans on the Plain of Marathon. This defeat of the Persians had great moral significance. The expedition had been small because the Persians believed that Greece could be conquered without much difficulty, but the defeat of this small force by a small force of Greeks greatly lessened the fear which was felt of the Persians.

By her part in the defeat of Persia, Athens had risen to the acknowledged headship of Greece. Themistocles, foreseeing that the struggle was not over, persuaded the Athenians to enlarge their naval force, upon which he felt sure the chief dependence of the Greeks would of necessity be in a further struggle. In 480 B. C. Xerxes, the son of Darius, undertook to carry out the project in which his father had twice signally failed. With an army which is

said to have numbered over 2,000,000, he crossed the Hellespont and marched along the coast through Thrace and Macedonia toward Attica. Sparta and Athens summoned a congress of the Greek cities to meet at Corinth, but not all of the cities were represented, and of those which were, all did not enter into the alliance. Themistocles proposed a plan of campaign which was finally adopted. This was to avoid a battle on land, because the Persian army was so much larger than the Greek, but to attempt to force a naval battle as soon as possible, because it was felt that on the sea Greece was more nearly the equal of Persia.

A small force was sent to block the enemy's advance at the narrow pass of Thermopylae, which formed the only entrance into Greece. On the third day of the struggle at Thermopylae the Persians were led around over a pass to the rear of the small Spartan army, and the defenders of the pass were all put to death. The great naval battle at Salamis and the battle at Plataea, in both of which the Greeks were victorious, drove the Persians from Greek territory, and they never again attempted to enter it. The victory for the Greeks had been the result of the united action of the different states, the superiority of the Greek infantry, the inability of the Persians to use their cavalry in the mountainous country and the superior seamanship of the Greeks. These wars in their happy issue gave the Greeks half a century of peace and gave Athens and Sparta, the two great powers, leisure to develop their civilization practically unhindered (See ATHENS, subhead *History*; SPARTA, subhead *History*). It was during this period that Athens reached her greatest height and became the center of Grecian art and literature (See PERICLES; AESCHYLUS; SOPHOCLES; EURIPIDES; SOCRATES; HERODOTUS; THUCYDIDES; XENOPHON).

The first serious break in the peaceful and prosperous condition of Greece came with the Peloponnesian War, which began in 431 B. C. The rivalry between Athens and Sparta was not such as to render war inevitable, as Athens was the chief power on the sea and Sparta on the land. There was constant jealousy between the two, however, and an occasion for war was found in the relation of Athens to her allied states. Sparta's plan at the beginning of the hostilities was to ravage Attica and stir up the colonies of Athens to revolt, while that of Pericles was to occupy as far as possible the coast towns and the islands, to destroy the commerce

of the Peloponnesus and to risk no land battles. This plan worked well for Athens until a plague broke out in the city and carried off more than one-fourth of the population. Pericles was among the victims, and there was no one who could take his place. The disastrous expedition to Sicily in 415 B. C. (See ALCIBIADES; NICIAS) turned the tide against Athens, and although she held out for ten years longer she was compelled by the destruction of her fleet at Aegospotamos, in 405, to surrender in the next year to Sparta and to accept the most humiliating conditions of peace.

The Athenian leadership was thus brought to an end, and for thirty-five years following the Peloponnesian War Sparta was supreme in Greece. The smaller Greek states, which had hoped for independence as the outcome of the war, were disappointed in their expectations, as the Spartan period of rule was marked by the restoration of oppressive and tyrannical oligarchies upon the ruins of the democracy for which Athens had been fighting. At length, so unendurable did this tyranny of Sparta become, the other states rose against her, under the leadership of Thebes. With Pelopidas and Epaminondas to guide the movement, the revolt was speedily successful, and at the great Battle of Leuctra, in 371, the hitherto undefeated Spartan army was utterly overthrown (See THEBES; EPAMINONDAS; PELOPIDAS). The Theban supremacy, which lasted for less than ten years, again made democracy the dominant form of government in Greece. In 361 B. C. Athens and Sparta, the old-time rivals, combined against Thebes. At the Battle of Mantinea Epaminondas was killed, and with his death the Theban power ended.

The death of Epaminondas threw Greece into confusion. The entire history of the Greek states had consisted in a series of struggles against the idea of unity under one imperial power, and these very struggles for independence had so weakened the states that they fell an easy prey to the strong power which was rising in the north. This was the kingdom of Macedonia, under Philip. By means of skilful intrigue and almost unopposed conquest, Philip gained control of Olynthus, Thrace and Phocis. At Athens Demosthenes saw the peril, and in his famous *Philippics* he urged his countrymen to meet it. Thebes and Athens combined against Philip and met him at Chaeronea in Boeotia (338 B. C.), but were utterly defeated. A congress of the Greek states, held at Corinth, recognized Philip as their

leader and declared him commander in chief of the Greek forces. This conquest by Philip did not mean the complete subjugation of the Greeks; the Macedonians were a Hellenic people, and Philip himself recognized the superiority of Greek life and culture over Macedonian. Philip was succeeded by his son Alexander (See ALEXANDER THE GREAT), under whom Grecian influence was extended over a great part of Asia.

The history of Greece and Macedonia for nearly two centuries after Alexander is marked by continued internal dissension, by the invasion of the Gauls (279 B. C.), and by the increasing danger from the rising power of the West. Most of the states were grouped under two confederacies, the Achaean and the Aetolian leagues. A united Greece might have remained independent, but under the prevailing conditions her resistance to Rome was but feeble and ended with the capture and burning of Corinth in 146 B. C., after which Greece was made a province of Rome, under the name of Achaia.

For over half a century the country prospered, but a revolt during the Mithridatic War brought down upon Greece the vengeance of Rome. Athens was sacked by Sulla in 86 B. C. and Thebes was destroyed in the following year. During the period following the establishment of the Empire, Greece prospered under Roman rule. Her condition was most favorable during the reign of Augustus and later under Trajan and Hadrian. Athens retained her preëminence in art and letters, and many of the young men of Rome were sent to Athenian schools. Christianity made wonderful progress during this period and finally triumphed over the ancient paganism. In 330 Constantine moved the seat of the Roman Empire to Byzantium, afterward called Constantinople. After the division of the Roman Empire into the Eastern and Western empires, in 395, Greece was a part of the Byzantine Empire until the capture of Constantinople by the Turks in 1453. See BYZANTINE EMPIRE.

After the fall of Constantinople, Greece was speedily subdued and was incorporated in the Turkish Empire. Under their barbarous conquerors, the Greeks sank into a pitiable condition, but their devotion to their Church and the fact that the system of local self-government had been allowed to exist helped in preserving their nationality, in spite of the persecutions of the Turks. In 1821 the war for independence broke out under Alexander Ypsilanti. The Turks by wholesale massacres and executions tried to check the revolt, but the Greeks were deter-

mined, and in January, 1822, the national assembly convened at Epidaurus, adopted a provisional constitution and proclaimed Greece independent. The cruelty with which the Turks treated the Greek Christians and also those in Constantinople aroused the sympathies of civilized Europe. Many champions appeared, among them Lord Byron. The struggle was continued for nine years, and one of the most memorable events during that time was the exploit of Marco Bozzaris (See BOZZARIS, MARCO). The struggle was finally decided by the naval battle of Navarino, October, 1827, in which the Turkish-Egyptian fleet was annihilated by the combined fleets of England, France and Russia. Capo d'Istria, a Greek statesman in the service of Russia, was chosen president in 1828. In 1830 a congress of the great powers in London declared Greece an independent kingdom and forced Turkey to agree to that declaration.

Capo d'Istria became unpopular, from his attempts to rule as dictator, and in 1831 he was assassinated. Otto II, son of the king of Bavaria, was chosen king, and he took the power in 1832. A constitution had not been formally promised, but the Greeks expected one, and, while Otto's rule was not despotic, the fact that he did not proclaim a constitution made them fear future danger. In September, 1843, the army and the people surrounded the palace and demanded a constitution. The king yielded without violence, and the constitution went into effect in the following year, but Otto's unpopularity increased, and in 1862 he was deposed and compelled to leave the country. The national assembly elected Prince George of Denmark as king, the powers confirmed the election and King George took office in October, 1863. According to the agreement made by England, the Ionian Islands were annexed to Greece in the same year. George granted a liberal constitution, and Greece prospered under his firm rule. The Congress of Berlin in 1878 recommended the addition to Greece of southern Thessaly and Albania. Turkey refused, and war seemed imminent, but was averted by the cession to Greece of nearly all of Thessaly and part of Epirus.

In January, 1897, Greece attracted the attention of the civilized world by her championship of the cause of the Christians in Crete, who had revolted against Turkish rule and sought annexation to Greece. Greece attempted to annex the island, and the result was war between Greece

and Turkey. The condition of Greece by no means warranted a war with Turkey, and from the first she was unsuccessful on every side. The Turks were threatening Central Greece in May, 1897, but Russia stepped in and demanded that operations cease. In December of that year a final treaty was signed, by which Greece promised to pay to Turkey an indemnity amounting to \$18,000,000, the payment to be guaranteed by the powers. In 1898 Turkey was compelled by the powers to withdraw from Crete, which was declared an independent state, with Prince George, son of the king of Greece, as governor. In 1912-13 Greece took part in the war of the Balkan allies against Turkey. As a result of that war Greece added considerably to its territory in the northeast, gaining a part of Macedonia, and the other allies also profited. Population in 1907, 2,631,952.

Greek Church, the church of the countries formerly comprised in the Greek, Eastern, or Byzantine, Empire, and of the countries converted to its teachings, as Russia. Its official name is "The Holy Orthodox Catholic and Apostolic Church," the word Orthodox being especially emphasized by its adherents. The so-called Greek Church is now divided into three distinct branches: 1, The Orthodox Church in the Turkish Empire, subject to the patriarch of Constantinople, who is under the protection of the sultan and has a certain official civil rank, but may be appointed and deposed at the will of the sultan. At Alexandria, Jerusalem and Antioch are subordinate patriarchates. 2, The Orthodox Church in Russia, under the Holy Synod of Saint Petersburg, and primarily under the czar, who is the recognized temporal head of the whole Greek Church. 3, The National Church of Greece, established under a Holy Synod since 1833. The so-called "United Greek Church," in Austria-Hungary, southern Italy, Poland and parts of Russia, conforms in some respects to the Greek rites, but acknowledges the supremacy of the Roman pontiff. The separation of the Greek and Roman churches is closely connected with the division of the Roman Empire into Eastern and Western. The rise of Constantinople and the growing jealousy and rivalry in Church and State made a continued condition of dependence impossible. The insertion in the Nicene Creed of *filioque* (and from the Son) by the Latin Church and the question of papal supremacy caused constant discord. In the latter part of the ninth century began the so-called Great Schism, but the final division did

not formally take place until 1054. Besides doctrinal differences, the war of the Iconoclasts, or "image breakers," contributed not a little to the discord, the patriarchs frequently supporting those who sought to destroy the images of the Latin Church. The conduct of the Latin princes at Constantinople during the Crusades and the establishment of the Latin kingdom there completed the separation. Ineffectual attempts were made to secure the adherence of the Greek Church in the period of the Protestant Reformation, first by Melancthon, later by a formal Lutheran embassy. In the following century the patriarch Lucaris, who was in sympathy with the Calvinistic doctrines of the West, tried to carry his fellow churchmen with him, but failed. As recently as 1869 a correspondence was entered into by the archbishop of Canterbury relative to a union of the Anglican and the Greek churches. The difference between the Greek and Roman churches consists in the rejection, by the former, of the supremacy of the pope and the elimination of the word *filioque* from its creed. They admit the seven rites of the Roman Church, namely, baptism, confirmation, eucharist, penance, extreme unction, holy orders and matrimony, but with considerable variation in their observance. Baptism consists of a triple immersion, and confirmation follows it immediately, even in the case of infants, and may be given by priests, as well as bishops. In the eucharist, or Lord's Supper, the Greeks admit the real presence of Christ in the elements, and the adoration of the host. They use leavened bread and give communion in both kinds to adults and children alike. They recognize confession and priestly absolution. The same honor is paid to relics as in the Roman Church; pictures are adored, but no graven image, except the cross, is permitted. Fast periods and days are numerous. Pentecost, the day of Saint Peter and Saint Paul; six weeks before Christmas, and the usual Lenten fast are kept, also all Wednesdays and Fridays. They believe in the intercession of saints, and, especially, of the Virgin Mary. Instrumental music is forbidden in the service, and singing is allowed by male voices only. In public prayer—except at Pentecost—they stand, with the face toward the east. Their ceremonial is formal and splendid. The priests and deacons are usually required to marry before being ordained as clergymen. They are prohibited from marrying widows and may not themselves remarry. Bishops are forbidden marriage and hence are chosen from the monas-

tic orders. The monastic institution has always existed in the Greek Church; convents are numerous. The total membership of the Greek Church is estimated at 98,016,000, of whom about 90,000,000 are in the Russian Empire.

Greek Fire, an inflammable and destructive compound used in mediæval warfare, especially by the Byzantine Greeks. It was poured from caldrons and ladles, vomited through long copper tubes or flung in pots, phials and barrels. The art of compounding it was concealed at Constantinople with the greatest care, but it appears that naphtha, sulphur and niter entered into its composition, which varied from time to time. The use of these combustibles was largely the cause of the superiority of the Greeks for centuries.

Greek Language. The Greek language is a member of the Aryan or Indo-European family, its various dialects constituting the Hellenic group. It was probably spoken at least 1500 years before our era by the Greeks in Europe and Asia Minor. The fact that Greece was the seat of classical learning, the source of philosophy and letters and, later, the center of Christian teaching, made Greek in the early centuries of our era a universal language among the cultured classes, just as Latin afterward became the medium of international communication. During the Dark Ages Greek was little known to Western Europe, although it remained the language of the Byzantine Empire. The emigration of the Greeks to Italy after the fall of Constantinople and during the century preceding, gave a new impetus to the study of the Greek language, and the revival of learning gave it the place it has ever since occupied (See RENAISSANCE).

Of Greek in its earliest common form no literary monument remains. The three dialects in which it appears are designated Doric, Aeolic and Ionic. Aeolic was spoken chiefly in Northern Greece; Doric in the Peloponnesus, in Crete and in the various colonies; Ionic was used in Attica and Asia Minor. Of the Doric, Pindar and Theocritus are the chief literary representatives. Ionic is commonly divided into three stages—the old Ionic, or epic, in which the poems of Homer and Hesiod were written; the new Ionic, the dialect of Herodotus, and the Attic, in which most of the masterpieces of Greek literature are written. The preëminence of Athens in the world of politics and of letters made its dialect the standard (See ATHENS, sub-head *History*). During the centuries following

the classical period, Greek underwent changes due to the usual internal modification and corruption and to contact with other languages. Modern Greek has, however, preserved the integrity of the written language to a remarkable degree, so that the student of classical Greek can read modern Greek with little difficulty. The spoken language varies considerably, at least from the commonly accepted standard of pronunciation of the ancient tongue. As compared with Latin, the legacy of Greek to our language has been small, less than one-ninth of the modern English vocabulary being of Greek origin, while nearly one-half may be traced back to sources originally Latin.

Greek Literature. See LITERATURE, sub-head *Greek Literature*.

Greeley, HORACE (1811–1872), an American journalist and politician, born in Amherst, N. H. He was employed first as a farm laborer, and then as a compositor, and in 1831 he went to New York, where, after an unsuccessful attempt to start the *Morning Post*, the first penny paper, he commenced in 1834 to issue the *Weekly New Yorker*, which ran for seven years. The *Log Cabin*, another weekly, established by him in 1840, reached a circulation of 80,000 and gave him a reputation which ensured the success of his *Daily Tribune*, founded in 1841 and edited by him till his death. In 1848 he was elected to Congress. In 1851 he visited Europe and was one of the jurors in the Great Exhibition. He was an earnest antislavery worker, though not an abolitionist, strictly speaking. When the South threatened to secede, he said that the people of any state had the right to withdraw, but he did not believe the votes for secession were fair expressions of the people's will and he therefore was a firm supporter of President Lincoln. At the close of the war, he advocated a general amnesty and universal suffrage, and he signed the bond of Jefferson Davis, securing his release. In 1872 he was nominated for the presidency by a party known as the Liberal Republicans and was supported by the Democrats, the Greenback party and many anti-administration Republicans, but was defeated by President Grant. The strain of electioneering and the death of his wife brought on an illness of which he died a few weeks later, before the count of the electoral vote. Chief among his literary works are his *Hints Toward Reforms*, *History of the Struggle for Slavery Extension*, *The American Conflict and Recollections of a Busy Life*. Consult Porter's *Life of Horace Greeley*.

Greely

Greely, ADOLPHUS WASHINGTON (1844–), an American soldier and explorer, born at Newburyport, Mass. He was a volunteer in the Civil War and was made captain and brevet major of volunteers. In 1868 he was placed in the signal service, and between 1876 and 1879 he constructed 2000 miles of military telegraph in the West. In 1881 he conducted an expedition to the Arctic regions, reached 83° 24', the farthest point reached up to that time, and made many valuable geographical discoveries. Of twenty-five men, only Greely and six others survived until the summer of 1884, when they were rescued by a relief party under Capt. W. S. Schley. In 1886 he published *Three Years of Arctic Service*, and in 1887 he was made chief of the signal service, with rank of brigadier general. Thousands of miles of wire and wireless telegraph were built under his direction in China, Cuba, Porto Rico and the Philippines between 1898 and 1905. He was the author of *American Weather* and *American Explorers and Travelers*. See NORTH POLAR EXPLORATION.

Green, ANNA KATHARINE. See ROHLFS, ANNA KATHARINE GREEN.

Green, JOHN RICHARD (1837–1883), an English historian. For some time he wrote constantly for the *Saturday Review*, but it was not until the publication of his *Short History of the English People* that he secured fame. This work was subsequently expanded into the *History of the English People*, in four volumes, which was followed by *The Making of England*, a work for scholars. After his death, his wife, who had always aided him in his work, published his *Conquest of England*.

Green'away, KATE (1846–1901), a famous illustrator of children's books. She passed most of her life at Hampstead, London. By formal study and painstaking observation of children, she produced a style of representation which was charming for its simplicity. Her best-known works are *Kate Greenaway Little Folks' Painting Book*, *Mother Goose* and *Language of Flowers*.

Green'back Party, a political party organized for the purpose of increasing the amount of greenback currency, as a means of allaying the distress caused by the increase in the value of the precious metals. The movement began about 1868, when it was proposed to retire gradually all the greenbacks, but the party did not organize formally until November, 1874. Its first presidential candidate was Peter Cooper, in 1876, who received about 180,000 votes; chiefly in the West. The party was united with the labor organizations

Greene

in the following year and was called the National, or Greenback-Labor, party. In 1878 it polled more than a million votes and elected fourteen congressmen. Its presidential candidate in 1880 was Weaver of Iowa, and in 1884, General Ben Butler, but its following constantly diminished, and it ceased to have important independent influence within a few years, being largely absorbed by the Populist party.

Greenbacks, the popular name given to the paper currency first issued by the United States government in 1862, during the Civil War. It is sometimes used also to include United States bank notes. See CURRENCY.

Green Bay, Wis., the county-seat of Brown co., 113 mi. n. of Milwaukee, on Green Bay, at the mouth of the Fox River and on the Chicago, Milwaukee & Saint Paul, the Chicago & Northwestern, the Green Bay & Western and other railroads. The city's harbor admits the largest lake steamers, and there is an extensive trade in lumber, grain, fish and other articles. The manufactures include furniture, paper, cheese, beer and canned goods. An old indian village was established on the shore of the bay, and the early French explorers here met the indians for their trade in fur. The first settlement was made in 1745. About 1816 Fort Howard was built on the west side of Fox River, and a settlement grew up around it. Green Bay was chartered as a city in 1854, and in 1896 Fort Howard was united with it. Population in 1910, 25,236.

Green Brier, a popular name in the United States for several very common, thorny, climbing shrubs, with yellowish-green stems, thick leaves and small bunches of flowers. *Smilax* is the correct name.

Green'bush, N. Y. See RENSSELAER, N. Y.

Greene, NATHANAEAL (1742–1786), a general of the American Revolutionary army, born at Patowomut, R. I. In 1770 he was elected to represent Coventry in the general assembly of Rhode Island, in 1774 he joined the Kentish Guards as a private and in May, 1775, he was appointed brigadier general and commander of the Rhode Island contingent in the army before Boston. He gained at once the confidence of Washington, was made major general and was appointed to the command of the troops in Long Island. In the early movements there he showed great skill, but his failure to withdraw his forces from Fort Washington resulted in a defeat (November, 1776). At Trenton, Princeton, Brandywine and Germantown he led a division, and in the subsequent fighting he held

Greenfield

important commands and repeatedly distinguished himself. In 1778 he was quartermaster general, and in 1780 he presided at the trial of Major André. In the same year he was appointed to the command of the southern army and succeeded, by turning repeated defeats to his ultimate advantage, in wresting Georgia and the Carolinas from the British. After the conclusion of peace Greene lived in Rhode Island until 1785, when he removed to Georgia. Among the American generals of the Revolutionary War, Greene ranks next to Washington as a tactician and field commander.

Greenfield, Mass., the county-seat of Franklin co., 34 mi. n. of Springfield, on the Connecticut River and on two lines of the Boston & Maine railroad. The town contains manufactories of cutlery, shoes, machinists' tools, wooden ware, bricks, toys, baby carriages and other articles. There are two public libraries, a county hospital and a soldiers' monument. It was settled in 1686, but remained a part of Deerfield until 1753. Population in 1910, 10,427.

Greengage, a large and finely flavored variety of the plum, well known in the United States. It is of a green or yellowish color and has a juicy, greenish pulp. See PLUM.

Greenheart, a tree, native of Guiana, called also the *bebeeru*. Its wood is hard and durable and is used in shipbuilding, not being liable to attacks from the teredo.

Greenhouse, a building for the protection and growth of delicate plants. It includes a forcing house, a hot house, a conservatory, an orchard house and other buildings and rooms for special purposes. A greenhouse in which a temperature higher than is necessary for the life of plants is maintained is called a *forcing house*, or *hot house*, and one which is used for the display of flowers, rather than for the growth of flowers, is a *conservatory*. Greenhouses are generally made of glass, an expedient which prevents the escape of much of the heat derived from the sun. When this heat is not sufficient, artificial heat is supplied. The smaller structures are heated with stoves; the largest and best constructed are heated by steam or hot water, carried in coils of pipe.

Greenland, an extensive island, belonging to Denmark, situated n. e. of the continent of North America, from which it is separated by Davis Strait, Baffin Bay and Smith Sound. The most northerly point does not extend farther than about latitude 83°. The surface

Green Mountains

of Greenland is mountainous throughout, having elevations from 2000 to 6000 feet above the sea, and is similar, in general appearance, to parts of Norway and Sweden. There are many deep fiords and thousands of glaciers, some of which are the largest in the world. Among these are the Humboldt, regarded as the largest of all known glaciers, having ice fronts of 45 to 60 miles; the Petowik, the Great Kariak and the Jakobshaven. The highest summit is Petermann Peak, which is 9000 feet above sea level. Though most of Greenland is covered with snow, during summer months the soil produces rich vegetation, consisting of shrubs, herbs, mosses, saxifrage, poppies and other Arctic plants. Among the animals living in the island are the polar bear, the lemming, the hare, the reindeer, the fox and the musk ox. The principal exports are whale and seal oil, seal-skin and eiderdown, and the trade is carried on by the Royal Danish Greenland Company. The best-known settlements are Upernivik (the most northern civilized settlement on the globe), Godhavn, Egedesminde and Ivigtut. The Norwegians were the first ones to set foot in Greenland and made settlements there in 983. In 1585 Davis rediscovered the island. In 1721 the Danes secured a hold on the west coast and established a number of mission stations, which prospered. The best-known explorations in Greenland have been those of Nordenskjöld, Greely, Nansen and Peary. The population of Greenland is estimated at about 12,000, most of whom are civilized Eskimos.

Green Mountain Boys, the name assumed by a body of soldiers from Vermont during the Revolutionary War. They were originally organized by Ethan Allen to oppose the claims of New York to the territory of Vermont, but they continued their organization throughout the Revolution, being responsible for some notable victories, including the capture of Ticonderoga and Crown Point and the Battle of Bennington.

Green Mountains, a mountain range of the Appalachian system, commencing near New Haven, Conn., and extending north through Massachusetts and Vermont, between Lake Champlain and the Connecticut River. The highest summits are Mansfield Mountain, 4364 feet; Killington Peak, 4241 feet, and Camel's Hump, 4088 feet. On the mountains grow forests of fir, pine, hemlock, birch and oak. They also contain valuable deposits of iron, slate, marble and copper.

Greenough

Greenough, *green'o*, HORATIO (1805-1852), an American sculptor, born in Boston, Mass. He graduated from Harvard in 1825 and while at college made a thorough study of anatomy. In his early period he made the design from which Bunker Hill monument was constructed. He studied in Rome and later had his studio in Florence. His works were mostly produced in Italy and are highly prized. His colossal statue of Washington is among the most important of them, and others are *Ariel*, *Chanting Cherubs* and *Wisdom*.

Green River, a river of Kentucky, which rises near the center of the state, flows generally westward and northwestward and enters the Ohio River 200 miles below Louisville. It is about 300 miles long and is navigable for boats for about 200 miles.

Greensboro, *greenz'bur o*, N. C., the county-seat of Guilford co., 81 mi. n. w. of Raleigh, on the Southern railroad. This city is in a fruit, grain and tobacco-growing region and is near great copper and iron mines. The industries also include blast furnaces, cotton mills and the manufacture of milling supplies, machinery, flour, brick and other articles. The place was settled in 1808 and was first chartered in 1870. Population in 1910, 15,895.

Greensburg, *lnd.*, the county-seat of Decatur co., 47 mi. s. e. of Indianapolis, on the Cleveland, Cincinnati, Chicago & Saint Louis and other railroads. The city is in a fertile agricultural region, has a beautiful park and is the seat of the Indiana Odd Fellows' Home. It is supplied with natural gas and has flour mills, carriage and furniture factories and large stone quarries. Population in 1910, 5420.

Greensburg, *Pa.*, the county-seat of Westmoreland co., 31 mi. s. e. of Pittsburg, on the Pennsylvania railroad. The borough is in a coal mining region, has natural gas and contains coke ovens, iron, glass and steel works and other factories. Several private institutions for secondary education are located here. Population in 1910, 13,012.

Greenville, *Miss.*, the county-seat of Washington co., 140 mi. s. of Memphis, on the Mississippi River and on the Yazoo & Mississippi Valley and the Southern railroads. The city is in a productive cotton region, has cottonseed oil and lumber mills and a large river trade. Population in 1910, 9610.

Greenville, *Ohio*, the county-seat of Darke co., on Greenville Creek, 35 mi. n. w. of Dayton and on the Cincinnati Northern, the Cleveland,

Greenwich

Cincinnati, Chicago & Saint Louis and other railroads. It is in an agricultural region, has considerable local trade and contains foundries, lumber mills, machine shops and other factories. Greenville is built on the site of an indian village, which was for a time the home of Tecumseh and his brother, The Prophet. General Wayne concluded his treaty with the indians here in August, 1795. The settlement was first incorporated in 1832. Population in 1910, 6237.

Greenville, *S. C.*, the county-seat of Greenville co., 153 mi. n. w. of Columbia, on the Southern and other railroads. The city is an educational center and is the seat of Furman College, Greenville Female College, Greenville College for Women, Chicora Female College, a military institute and a business college. The industries include flour and cotton mills, carriage works and other factories. The place was settled in 1784 and was incorporated in 1831. Population in 1910, 15,741.

Greenville, *Tex.*, the county-seat of Hunt co., 56 mi. n. e. of Dallas, on the Missouri, Kansas & Texas and other railroads. The city is in an agricultural and stock-raising region and has an extensive cotton trade and large manufactories of cotton products, also stockyards, flour mills, machine shops and brickyards. It is the seat of Burleson and Holiness colleges. Greenville was settled in 1844 and was incorporated in 1875. Population in 1910, 8850.

Greenwich, *grin'ij* or *green'ij*, a parliamentary borough of England, in the County of Kent, on the right bank of the Thames, about 5 mi. s. e. of London Bridge. There are extensive iron foundries and engineering works, boat-building yards, boiler works, mast, block and sail works, telegraph cable works, roperies and chemical factories. An object of great interest is the magnificent hospital, the oldest portion of which was originally a palace of Charles II. As a hospital for aged and disabled seamen of the navy, it was opened in 1705, and it subsequently accommodated about 3000. In 1865, however, it ceased to be an asylum for seamen, and it is now the seat of the Royal Naval College for the education of naval officers. The celebrated observatory of Greenwich, erected by Charles II in 1675, stands upon an eminence in the park. The longitude of all British maps and charts and of those issued by many other nations is computed from this observatory. Population, in 1911, 96,000.

Grégoire, *gra gwahr'*, HENRI, Count (1750–1831), bishop of Blois, a churchman and statesman of the French Revolution. He was instrumental in having slavery abolished in all the French possessions and worked for giving to the Jews in France full civil rights. He was a member of the Council of Five Hundred and of the Senate (1801). On the conclusion of the concordat he resigned his bishopric. He voted against the establishment of the Empire and was the only one in the Senate who resisted the restoration of titles of nobility. He himself afterward accepted the title of count, but in the Senate he was always one of the small body who opposed Napoleon, and in 1814 he was one of the first to vote for his deposition. He passed the latter part of his life in retirement, and at his death the Church refused him the last offices of religion. He left numerous works, among them *The Ruins of Port Royal*, *Historical Essay upon the Immunities of the Gallican Church*, *History of Religious Sects since the Beginning of the Century* and *The Annals of Religion*.

Gregorian Calendar, the calendar as reformed by Pope Gregory XIII, in 1582. The *Gregorian year* is the ordinary year, as reckoned according to the Gregorian calendar. See CALENDAR.

Gregory, the name of sixteen popes and two antipopes. GREGORY I (540–604) (called also *the Great*), was born at Rome, of noble and wealthy family. He became a member of the Senate, and was made prefect of Rome in 573. He expended his inheritance in the foundation of monasteries and charitable institutions, and he then took monastic vows himself. During this time he saw the beautiful Anglo-Saxon youths in the market-place and resolved to go to England himself and work for the conversion of their people. Pope Benedict I would not allow him to go. Pope Pelagius II sent him on an embassy to Constantinople and afterward made him papal secretary. On the death of Pelagius, in 590, Gregory was chosen his successor. He displayed great zeal for the conversion of heretics, sending missionaries to Sicily, Sardinia, Lombardy and England, as well as for the advancement of monachism and the enforcement of clerical celibacy. The works ascribed to him are very numerous; his genuine writings consist of a treatise on the *Pastoral Duty*, *Letters* and *Scripture Commentaries*. GREGORY VII (Hildebrand), pope from 1073 to 1085. His chief aim was to found a theocracy, in which the

pope should be the sovereign ruler in political, as well as ecclesiastical, matters. He therefore prohibited simony and the marriage of priests (1074) and abolished lay investiture (1075), the only remaining source of the authority of princes over the clergy of their dominions. The emperor Henry IV refused to obey this decree, and Gregory, after deposing several German bishops who had bought their offices of the emperor, and excommunicating five imperial councilors concerned in this transaction, summoned the emperor before a council at Rome to defend himself against the charges brought against him. Henry then caused a sentence of deposition to be passed against the pope by a council assembled at Worms. The pope, in return, excommunicated the emperor, and Henry, finding himself in difficulties, went to Italy, submitted at Canossa (1077) to a humiliating penance and received absolution. Gregory says that the emperor, "having laid aside all belongings of royalty, wretchedly, with bare feet and clad in wool, continued for three days to stand before the gates of the castle" before the pope would admit Henry to his presence. After defeating Rudolph of Suabia, however, Henry caused the pope to be deposed by the Council of Brixen and caused an antipope, Clement III, to be elected in 1080, after which he hastened to Rome and placed the new pope on the throne. Gregory passed three years as a prisoner in the castle of Saint Angelo, but was finally liberated and died in retirement at Salerno. His dying words were, "I have loved justice and hated iniquity; therefore I die in exile." GREGORY XIII (1502–1585), Ugo Buoncompagno, born and educated at Bologna. He settled in Rome in 1539 and was one of the theologians of the Council of Trent. On his return to Rome he was made cardinal and in 1572, on the death of Pius V, was elected pope. He was a patron of education, and a large portion of the colleges in Rome were wholly or in part endowed by him. A notable event of his pontificate was the correction of the calendar. He did much to strengthen the Jesuit order. GREGORY XV (1554–1623), born at Bologna. During his pontificate the Congregation for the Propagation of the Faith was established, and the present method of conducting the Papal Conclave was instituted. GREGORY XVI (1765–1846), a Venetian Oriental scholar and teacher of theology. In 1826 he was made cardinal prefect of the Propaganda and in this capacity made an agreement with the Netherlands regarding

Roman Catholic citizens, regulated Church matters in the United States and secured for the Catholics in Armenia emancipation from the sultan. In 1831 he was made pope, and during his pontificate he continued to extend the power and influence of the Church. He was a liberal patron of the arts and sciences. His most famous work was *The Triumphs of Papacy*.

Gregory, LADY AUGUSTA PERSSE, a British author, born at Roxborough, County Galway, Ireland. She was married in 1881 to Sir William Gregory, who died in 1892. Lady Gregory was from the first much interested in the movement for preserving the lore and the vernacular of Ireland, and published several books of legends told in the popular language. She produced, also, a number of plays which are faithful pictures, in their mingled humor and pathos, of the life of the Irish peasantry. These plays were produced by the Irish Players, and aroused much favorable comment. Her books include *Poets and Dreamers*, *Cuchulain of Muirthemne*, *Gods and Fighting Men* and *The Kiltartan Wonder Book*, and her plays *Spreading the News*, *The Canavans*, *The Rising of the Moon* and *The Workhouse Ward*.

Grenada, one of the British West India islands, about 85 mi. n. w. of Trinidad. It is oblong in form, 24½ mi. long and 10 mi. broad, with an area of 133 sq. mi. The island is traversed north to south by an irregular mass of volcanic mountains, attaining elevations of 3000 and 3200 feet above sea level and having lateral branches of lower hills. The valleys between these contain alluvial tracts of great fertility, and rivers and rivulets are numerous. Cocoa, sugar, rum and spices stand first in the exports. The island has a lieutenant governor and a local legislature consisting of a council and a house of assembly of seventeen elected members. The capital is Saint George. Grenada was discovered by Columbus in his third voyage in 1498 and was colonized about the middle of the seventeenth century by the French. In 1762 it was taken by the British, and though recaptured by the French in 1779 it was restored to Great Britain in 1783. Population in 1911, 66,750.

Grenade, *gre nade'*, a small hollow bullet, or ball, of iron or other metal or of annealed glass, about 2½ inches in diameter, filled with gunpowder and fired by a fuse, so as to cause it to burst when thrown among the enemy. The term was first used by Du Billy, in reference to the siege of Arles (1536). Until about the

end of the seventeenth century, when musketry became common, soldiers of the line were trained to throw grenades by hand; hence the name *grenadier*.

Grenadier, *gren a deer'*, originally a soldier assigned to throwing the hand grenades. Companies of grenadiers were formed in France in 1670, and in England a few years later. With the development of the musket, the name soon became only a *souvenir* of the ancient practice; the troops so called generally formed one battalion of a regiment, distinguished by the height of the men and a particular dress, as, for instance, the high bear-skin cap. With the British and French the grenadier company was the first of each battalion.

Grenfell, WILFRED THOMASEN (1865-), a medical missionary, noted for his work among the fishermen of Labrador. He was born near Chester, England, and educated at Oxford and at London Hospital. In 1889, under the auspices of the Royal National Mission to Deep Sea Fishermen, he fitted out a hospital ship and accompanied the fishermen of the North Sea on their cruises from the Bay of Biscay to Iceland. After three years in the work there he went to Labrador, where he established four hospitals, an orphanage, and various other institutions which he felt would be of help to the fisherfolk of that region. His little hospital ship makes voyages up and down the coast and he goes ashore at the scattered villages. His publications include *Adrift on a Pack of Ice*, *Off the Rocks, Labrador* and *Down to the Sea*.

Grenoble, *gre no'bl'*, a fortified town of France, capital of the Department of Isère, on the Isère River, 60 mi. s. e. of Lyons. It has a public library of 170,000 volumes and 7500 manuscripts, a college, a museum, a bishop's palace, a courthouse, an arsenal and extensive public gardens. The manufactures consist of gloves, linen and hemp goods, liquors and leather. Grenoble existed in the time of Caesar, and Gratian, who had improved it, changed its name from *Clularo* to *Gratianopolis*. Population in 1911, 77,438.

Gresham, WALTER QUINTON (1832-1895), an American jurist and politician, born in Indiana. He was educated at Indiana State University and was admitted to the bar in 1853, being elected to the state legislature in 1860 as a Republican. At the outbreak of the war he joined the Union forces and was made colonel of an Indiana regiment. Later he was brevetted brigadier general and then major general of volunteers. He was

appointed United States judge for Indiana in 1869 and was made postmaster-general under President Arthur in 1882. In 1884 he again became Federal judge. In 1893 he endorsed the Democratic platform, and he became secretary of state under President Cleveland in that year.

Gresham's Law, an economic principle, first announced by Sir Thomas Gresham, to the effect that when two different forms of money are in use, the one of lesser intrinsic, or bullion, value will always drive the one of greater value from use. This is due to the fact that coins of greater value will be reserved for foreign trade, since in those transactions the bullion value only is considered. The law has been applied in recent discussion to the question of bimetallism, the claim being made that the coin of lower value will drive the greater from use. This would be possible only provided that the demand for money did not equal the supply. See MONEY.

Gret'na Green, a village of Scotland, in Dumfriesshire, on the Solway Firth, 8 mi. n. of Carlisle, for nearly a century notorious for the celebration of the marriages of fugitive lovers from England. To conclude a lawful marriage in Scotland, it was only necessary for an unmarried couple to go and declare themselves man and wife before witnesses; but such marriages were ended in 1856, by an act declaring that no irregular marriage in Scotland shall be valid, unless one of the parties has resided in Scotland for twenty-one days next preceding such marriage.

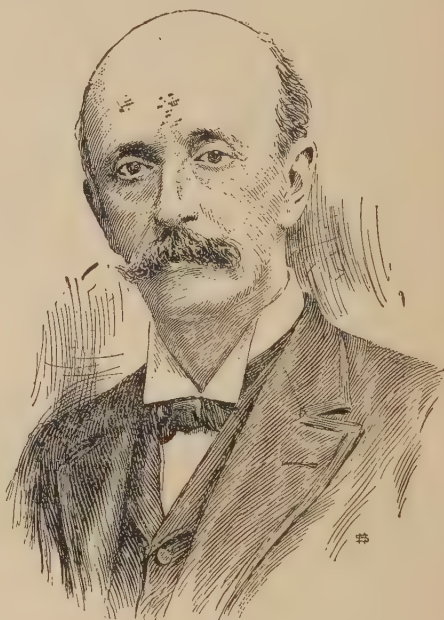
Gretry, *gra tre'*, ANDRÉ ERNEST MODESTE (1741-1813), a famous French composer, born at Liege. He received his instruction under private tutors. The composition of a mass secured for him a course of study in Rome under the auspices of a high Church officer. His eagerness and impatience under the restraints of diligent study prevented his making as great progress as his natural talent would have made possible for him. He left Rome and after considerable hardship secured the coöperation of influential persons and wrote the music for Marmonter's *Le Huron*, which was his principal work and the one upon which his fame rests. Most of his work is now neglected, though much of it contains pleasing melody and dramatic fervor.

Greuze, *gröz*, JEAN BAPTISTE (1725-1805), a French artist, who painted many religious subjects with charming delicacy and perfection. Among his best-known paintings are *Father*

Explaining the Bible to His Children, *The Blind Man Cheated* and *The Broken Pitcher*.

Grevy, *gra ve'*, JULES (1807-1891), a French statesman, a president of the French Republic. He held several public offices during his early life, and in 1848 he was made a member of the National Assembly. After the proclamation of the Second Empire, he retired from political life and won a high reputation at the bar. When the Republic was declared, he was again returned to the National Assembly and became in 1871 its president. On the resignation of President MacMahon in 1879, Grévy was chosen president of the Republic for seven years, and in 1886 he was reelected. He resigned in December, 1887.

Grey, *gray*, ALBERT HENRY, Sir (1851-), fourth earl of Northumberland, an English



EARL GREY

statesman. He was educated at Harrow and at Trinity College, Cambridge, where he graduated with honors. He was a Liberal member of Parliament for six years, and in 1896 succeeded Cecil Rhodes as representative of the British South Africa Company, of which he was a director. Three years later he became lord lieutenant of Northumberland, and in 1905 he became governor-general of Canada, succeeding Lord Minto. He resigned his office in Canada in 1911, and returned to England.

Grey, CHARLES, Earl (1764-1845), an English statesman, educated at Eton and at Cam-

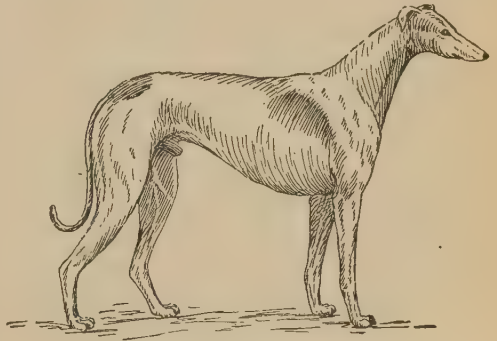
bridge. In 1786 he was returned to Parliament as member for Northumberland, and he soon became prominent in all important discussions. From the first he was deeply interested in the question of Parliamentary reform, and several times he presented petitions for reform. On the accession of the Grenville ministry in 1806, Grey was made lord of the admiralty, and on the death of Fox he succeeded to the office of secretary of foreign affairs and to the leadership of the House of Commons. The death of his father in 1807 raised him to the House of Lords, and from this time to 1830 he headed the Whig opposition in the House of Lords and especially opposed the proceedings against Queen Caroline. On the accession of William IV in 1830 and the retirement of the Wellington ministry, Grey was made prime minister and immediately took up the old question of Parliamentary reform. In 1832, after meeting with opposition which seemed insurmountable, he managed to pass his reform bill by inducing William IV to promise to create enough new peers to pass the bill. The threat of such a measure was enough to secure the carrying of the bill in the House of Lords. This bill, as put through by Grey, provided for the reform of the "rotten borough" abuses and increased representation for the northern cities and boroughs.

Grey, LADY JANE (1537-1554), the daughter of Henry Grey, afterward duke of Suffolk, and Frances Brandon, the daughter of Mary, sister of Henry VIII. She was married to Lord Guildford Dudley, the son of the duke of Northumberland, in 1553. Edward VI, who died in 1553, was induced on his deathbed to settle on her the succession to the crown, and the council tried to keep his death a secret that Mary and Elizabeth might be secured before the proclamation of Lady Jane as queen. Within ten days after the proclamation, however, Mary's claims had been recognized, and Lady Jane was confined to the Tower. She and her husband were beheaded on Tower Hill in February, 1554.

Grey'hound, a variety of dog, distinguished by the long muzzle, very low forehead, short lips, thin and long legs, small muscles and contracted belly. There are several varieties, as the Irish, the Scottish, the Russian, the Italian and the Turkish. The common greyhound is of a slender build and is universally known as the fleetest of dogs. The name appears to have no reference to the color, but is derived from the Icelandic *grey*, a dog. The chief breeds are the Newmarket, the Lancashire and the Scotch.

Grieg, greeg, EDVARD HAGERUP (1843-1907), one of the most famous of Norwegian musicians, born at Bergen, Norway. He studied at Leipzig, later at Copenhagen and made several trips through Italy, Germany and England, earning everywhere well-merited praise for his playing of the piano. But he early began to devote himself almost entirely to composition. Grieg's music is filled with the enthusiasm and vigor of Scandinavian life, and many of his themes are drawn from Norwegian folk stories and national airs. Probably his most famous composition is the *Peer Gynt Suite*.

Grif'fin or Gryphon, a fabulous monster of antiquity, commonly represented with the body, feet and claws of a lion and the head and wings of an eagle. India or Scythia was anciently assigned as the native country of the griffins,



GREYHOUND

and it was alleged that they guarded the gold in the mountains. The figure of the griffin was common in heraldry.

Griffin, GA., the county-seat of Spalding co., 43 mi. s. of Atlanta, on the Southern and the Central of Georgia railroads. The city is in a cotton and fruit-growing region and has some reputation as a resort. Wine is manufactured, grapes and peaches are largely exported and the town has large cotton mills. The state experiment farm is near the city. Population in 1910, 7478.

Griffis, WILLIAM ELIOT (1843-), an American educator, author and clergyman, born in Philadelphia. He served in the civil war and later graduated from Rutgers College. Soon afterwards he went to Japan, where he organized schools on the American model, and later was appointed professor of physical science in the Imperial University of Tokyo. During his service there he wrote for the Japanese and English press. In 1874 he returned to New

York, where he finished his theological course and became pastor of a Reformed church in Schenectady, N. Y. Later he had charge of Congregational churches in Boston, Mass., and Ithaca, N. Y. Among his works published in book form are *The Mikado's Empire*; *Korea, the Hermit Nation*; *Matthew Calbraith Perry*; *Japan in History, Folklore and Art*; *Brave Little Holland and What She Taught Us*; *The Pilgrims and Their Three Homes, England, Holland and America*, and *America in the East*.

Grimm, JACOB LUDWIG (1785-1863) and WILHELM KARL (1786-1859), two brothers, German philologists and students of folklore. Jacob was professor and Wilhelm librarian at the University of Göttingen, but they were both expelled for political reasons, and later received positions in the University of Berlin. Their philological studies were extremely important, especially those of Jacob, whose *German Grammar* and *History of the German Language* became deservedly famous. The Brothers Grimm are most widely known, however, for the folk tales known in English as *Grimm's Fairy Tales*. They visited the old country folk, taking down from their lips the tales which had never been reduced to writing. *Grimm's Fairy Tales* have not the delicacy which distinguishes Andersen's but many of them are extremely popular.

Grindstone, a circular stone used for sharpening edged tools and smoothing surfaces. Grindstones are made from blocks of sandstone, which are fashioned into the desired shape and size. The stone is mounted on an axis, which passes through the center and is supported at each end on a frame. Small grindstones are frequently turned by hand or foot, but larger ones are operated by machinery. Those used in factories often weigh several tons. In grinding, the stone should revolve away from the one holding the tool. Great speed should be avoided with large stones, since the strain upon the stone when revolving at a high rate of speed sometimes causes it to break, hurling pieces with great force for long distances.

Grippe, *grip*, (French *La Grippe*), an infectious disease that frequently appears in epidemics during cold, damp seasons. See INFLUENZA.

Griqualand, *gre'kwah land*, **West**, a district of South Africa, n. of the Orange River and w. of the Orange Free State, with an area of about 15,190 sq. mi. The surface consists of undulating, grassy plains, suitable for grazing. Previous to the discovery of the diamond fields in the basin of the Vaal River, Griqualand was little

known. In 1870 the discovery of diamonds in that district began to attract wide notice, and in 1871 Waterboer, the Griqua chief, ceded all his rights to the British government and the territory was incorporated with Cape Colony. The diamond mines here are the most productive in the world. The chief center of this industry, as well as the seat of government, is Kimberley (See DIAMOND; KIMBERLEY). Population, 120,000.

Gris-nez, *gre na'*, CAPE, a headland of France, the nearest point of the French shore to that of Britain, the distance being barely 21 miles. It has a revolving light, 195 feet high.

Gristle, *gris'l*. See CARTILAGE.

Grizzly Bear. See BEAR.

Grod'no, a town of Russian Poland, capital of the government of the same name, on the Niemen, 160 mi. n. e. of Warsaw. The principal edifice is a palace erected by Augustus II; the oldest building is the Bernardine monastery, built in 1494. The manufactures consist of woolen, linen and silk goods, firearms and machinery. Grodno came under Russian control in 1795. Population in 1910, 54,900.

Grom'well, a name given to a genus of plants of the borage family. There are about forty species, of which eight or ten are found in the United States. The *field gromwell*, common along roadsides, grows to a height of one foot or more. It has broad leaves, downy beneath, and white flowers with small scales. A larger species is also found in similar locations. Other names by which they are known are *wheat thief*, *red root* and *stoneseed*. The plants bloom in the summer, and their seeds are often mingled with the seed of grains. Some yield a dye which is similar to the alkanet.

Gro'ningen, a town of the Netherlands, capital of a province of the same name, situated on the river Hunse, here converted into a canal, 92 mi. n. e. of Amsterdam. The principal edifices are the cathedral, a fine exchange, the government buildings and the university. It has manufactures of sugar, textiles, furniture, gold and silver ware, white lead and soap. There are oil, fulling and saw mills; an excellent harbor provides facilities for shipping. The town became a member of the Hanseatic League about 1282, and was annexed to the Netherlands in 1594. Population in 1910, 75,341.

Gros, *gro*, ANTOINE-JEAN, Baron (1771-1835), a French historical painter, born at Paris. At an early age he began studying with David and became one of his greatest pupils. Gros was the first one to depart from the classic art of

Grosbeak

David and to use historical subjects in preference to classic. He was early associated with Napoleon and was thus given an opportunity to acquire material for the battle scenes which he produced. There is excellent coloring and depth of feeling in his paintings. In 1804 he produced his *Plague at Jaffa*, representing Napoleon ministering to the sick, a work which made him famous. His chief work is probably the *Cupola of Saint Genevieve* at Paris, exhibiting the saint protecting the throne of France, represented by Clovis, Charlemagne, Saint Louis and Louis XVIII. The artist received for it \$20,000 and the title of baron.

Grosbeak, *grose'beek*, a general name for a number of different birds whose beaks are large in proportion to the size of their bodies. In the United States the name is applied to a group of handsome finches that have strong, thick bills, which enable them to crack open even the stones of cherries. The *rose-breasted grosbeak*, which is one of the prettiest, has a sweet, simple little song. The male is largely black, with white lower parts and a beautiful rose-red breast. In the Southern states is found the *blue grosbeak*; to the north and west the *evening grosbeak*, and along the Atlantic coast and toward the interior, the *pine grosbeak*. In England the common species is often called the *hawfinch*.

Grosswardein, *grose'vahr dine*, or **Nagy-varad**, *nod'yvah'rod*, a royal free city of Hungary, capital of County Bihar, in a beautiful plain, on the Körös, 38 mi. s. s. e. of Debreczin. It consists of the town proper, surrounded by walls and otherwise fortified, and extensive suburbs. It is tolerably well built and is a railway center. The staple manufacture is earthenware. Population in 1910, 64,169.

Grosvenor, *gro've nur*, CHARLES HENRY (1833-), an American lawyer and politician, born at Pomfret, Conn. He moved to Ohio in 1838, taught school for a time, studied law and was admitted to the bar in 1857. He served in the Union army from July, 1861, to November, 1865, being promoted from major to brigadier general. In 1874 he was elected to the state legislature and in 1885 to Congress as a Republican; he served until 1891 and again from 1893 to 1907. In Congress he became prominent as a leader of the conservative faction of the Republican party and was a member of many important committees.

Grote, GEORGE (1794-1871), an English historian and politician. As early as 1822 he began to collect materials for his *History of Greece*,

Ground Squirrel

which appeared in twelve volumes between 1845 and 1856. This work, which terminates with the death of Alexander, was one which Grote was especially fitted to write, owing to his devotion to democratic ideas.

Grotius, *gro'she us*, or **De Groot**, HUGO (1583-1645), a Dutch scholar, born at Delft and educated at the University of Leyden. His work, *De Jure Belli et Pacis* (On the Law of War and Peace), on the fundamental principles of international law, is considered a standard authority and the foundation of modern knowledge of the subject.

Grouchy, *groo she'*, EMMANUEL, Marquis de (1766-1847), a noted French marshal. He entered the Royal Life Guards at the age of fourteen, saw much service and highly distinguished himself. In the war with Prussia (1806) and Russia (1807) and at Wagram, he acquired increased renown. After Blücher's defeat at Ligny in 1815, Grouchy was ordered to follow the Prussian retreat, and his strict and unreasoning obedience to this order was the cause of his absence from Waterloo and of Napoleon's defeat. He was banished under the second Restoration and lived a few years at Philadelphia. He returned to France in 1821, and under Louis Philippe he was restored to his former rank of marshal.

Ground, in painting, the first layer of color, which serves as a basis for the picture. The Italian school preceding and during the time of Raphael employed white grounds, but afterward, with the increased use of canvas, they adopted an oil ground of a dull red color. The Dutch and Flemish masters used light grounds, varying from white to gray; their example has been followed by painters of the modern European schools.

Ground Hog. See WOODCHUCK.

Ground Ivy, a common wayside plant of the mint family, with a creeping stem and purple flowers. It grows abundantly in Great Britain and is naturalized in the United States. In the spring it bears a large number of purple flowers. It was formerly used in flavoring ale.

Ground'nut, a name for the common peanut or for the tubers of certain other plants. See EARTHNUT; PEANUT.

Ground Squirrel, the name of a genus of squirrels, somewhat resembling the marmot. They differ from the common squirrel in that they possess cheek pouches and retreat into burrows. They are well known in America, but species are also found in Asia and Africa. See CHIPMUNK; GOPHER. (See illustration on next page.)

Grouse

Grouse, a group of birds, related to the domestic fowls, of which different species are found in many countries. The grouse usually live on the ground and always nest there. They are shy and almost untamable; they live



GROUND SQUIRREL

during a portion of the year in families and confine themselves to forests and partially barren regions, where they feed on berries, buds, leaves and insects, which they often uncover by scratching. It is their habit to lie hidden until their enemy is almost on them



GROUSE

and then to fly off rapidly with a great whirring of wings. The male birds become fierce in the breeding season and, after dancing and performing various antics before the hens, they fight viciously, the victor mating with the whole flock of hens; but as soon as the females begin to sit, the male leaves them alone to take the entire care of their offspring. Their eggs number from eight to fourteen. The young are very sprightly and leave the nest almost as soon as they are hatched, and on the least alarm they hide themselves skilfully. In the United

Grunt

States there are a number of different species, chief of which is the *ruffed grouse*, *partridge*, or *pheasant*, as it is called in different localities. This bird is of a brownish color, with a light spotted breast, and like the other grouse it is a trim bird of plump form. On the neck of the male are two large patches of black feathers, which it opens out in a fan-like way at times. The deep throbbing sound produced by this bird regularly in spring and occasionally in autumn is not easily forgotten by any one who has heard it. The ruffed grouse are considered among the finest American game birds and are shot in large numbers by sportsmen every autumn. Most of the states limit to a few months the period during which they may be hunted. The *prairie chicken* is another grouse. It once was exceedingly common in large flocks throughout the Central states, but it has been almost exterminated in many regions of the United States where it was once very numerous. On each side of the neck of the male is a large bare tract, which can be inflated at will, so that it looks like a great orange. The necks are also tufted with long black feathers. The sound the prairie chicken makes is a loud, hollow booming that is almost as peculiar as the drumming of the ruffed grouse. There are a number of different species of the grouse to be found in Europe, where they are favorites with the sportsmen. See SAGE GROUSE.

Grow, GALUSHA AARON (1822-1907), an American statesman, born at Eastford, Conn. He removed to Pennsylvania in 1834, graduated from Amherst College in 1844 and was admitted to the bar. In 1850 he was elected to Congress and served twelve years, first as Free-Soil Democrat, then as Republican. He was elected speaker of the House in 1861. Grow was chosen congressman-at-large in 1894 and served until 1903, when he retired.

Grubber, a sort of cultivator for tearing and loosening soil and for digging up roots. It consists of an iron framework, with handles and wheels, and is provided with curved *tines*, or teeth. In the most modern kinds the wheels are arranged three in front and two behind. The depth to which the teeth may penetrate is regulated by suitable mechanism.

Grunt, an American species of drumfish, also called *pigfish* and *redmouth*. The first of these names relates to the sound it emits when taken out of the water, the last to blood-red marks on the gums, or lips. The *growler*, found off America, also emits a grunting sound.

Grunter

Grunter. See GURNARD.

Guadalajara, *gwah'dah lah hah'rah*, a city of Mexico, capital of the State of Jalisco, in the fruitful valley of Atemajac, on the Rio de Santiago. It is a large and handsome city, with a fine cathedral, a university, a mint, several convents, a high school and an art academy. The city contains a library of 24,000 volumes and has a number of literary and scientific institutions. Manufacturing is carried on, the principal products being silversmiths' and goldsmiths' wares, paper, leather, hats, pottery and cloth. Population in 1910, 118,799.

Guadalquivir, *gaw'dal kwiv'ur*, a river of Spain, which rises in the frontiers of Murcia, traverses Andalusia from northeast to southwest, passing the towns of Cordova and Seville, and thereafter flowing southwest, falls into the Atlantic. Its course is 250 miles, of which 70 are navigable. It abounds with fish.

Guadalupe Hidalgo, *gwah'da loo'pay he-dal'go*, TREATY OF, the treaty between Mexico and the United States, which ended the Mexican War. It was signed February 2, 1848, and was ratified in the following May. By it the Rio Grande was established as the boundary of the eastern portion and the Gila and Colorado rivers in the west. The United States paid Mexico \$15,000,000 and assumed the payment of claims, amounting to \$3,250,000, of American citizens against Mexicans.

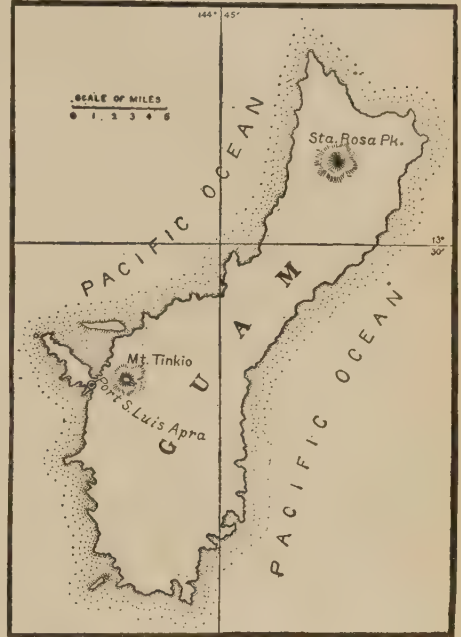
Guadeloupe, *gaw de loop'*, an island of the French West Indies, composed of two portions, separated by a narrow arm of the sea, called Rivière Salée. The western and larger portion is Basse-Terre, or Guadeloupe proper, 27 miles long and about 15 miles broad. It is of volcanic formation, the culminating point being La Soufrière, 5018 feet high. The eastern portion, called Grande-Terre, is nearly 30 miles long by 10 to 12 miles broad. It is generally flat and of coral formation. The climate of Guadeloupe is hot and unhealthful, with a humid atmosphere, and hurricanes are frequent and destructive. The soil is fertile and is covered with fine forests. The chief articles of cultivation are sugar, coffee, cacao, bananas and manioc. The chief towns are Basse-Terre, the capital, and Pointe-à-Pitre. After belonging at various times to the English and the French, these islands were ceded to France in 1814. Population in 1911, 212,430.

Guadiana, *gwah'de ah'nah*, a river of Spain, which rises in New Castile, flows first northwest, then southwest, into Estremadura; on

Guanaco

reaching Badajoz it begins to form part of the boundary between Spain and Portugal, and it finally falls into the Atlantic, below the town of Ayamonte. It has a length of about 520 miles, of which only 35 are navigable.

Guam, *gwahm*, or **Guajan**, *gwah hahn'*, the largest of the Ladrone Islands in the Pacific, 1500 mi. e. of Manila, discovered by Magellan

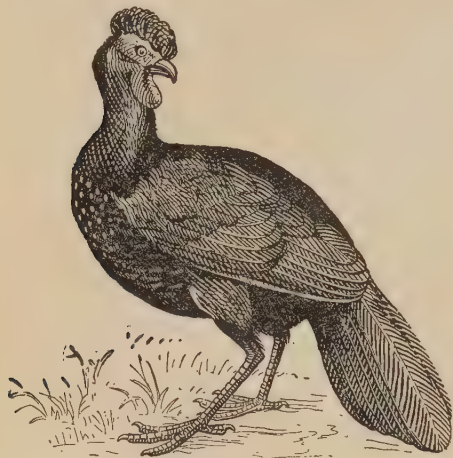


in 1521. Agaña, the former Spanish capital of the Ladrone, is situated upon this island. It formerly belonged to Spain, but by a treaty at the close of the Spanish-American War, it came into the hands of the United States. It is a naval station and a port of transit between America and Asia. The surface is mountainous and the soil fertile, producing rice, cocoanut and indigo. Population in 1911, 12,240.

Guan, *gwahn*, a bird related to the grouse and partridge, a native of Central and South America. These birds, of which there are several species, are easily domesticated and are often seen about native villages, though their natural home is in trees and on the ground, where they feed upon fruits and seeds. They are mainly black in color and have crested heads and long, handsome tails. They usually live in flocks, but separate into pairs during the breeding season. (See illustration on next page.)

Guanaco, *gwah nah'ko*, one of the two wild species of the camel family, of which the llama

and alpaca are the domesticated varieties. It abounds in Chile and Patagonia, attains a height of nearly four feet at the shoulders and is extremely swift and sure-footed. It is cov-



GUANO

ered with long, reddish, woolly hair, and its skin is much used for clothing and tents. When domesticated its flesh, wool and milk are prized by the natives. See ALPACA; LLAMA; CAMEL.

Guanajuato, *gwah'na whah'to*, a city of Mexico, capital of the state of the same name, 165 mi. n. w. of Mexico, is situated in a narrow defile, hemmed in by mountains, at the height of 6800 feet above the sea. It has steep, irregular streets, but well-built houses. The most important buildings are the cathedral, a college, a gymnasium and the mint. The city is located in the vicinity of extensive silver mines. The leading manufactures are silverware, pottery, soap and chemicals. Population in 1910, 35,147.

Guano, *gwah'no*, a valuable manure, consisting of the decomposed excrement of sea birds. The largest deposits of guano were formerly on the Chincha Islands off the coast of Peru, but these have been entirely exhausted. Smaller deposits are found on neighboring islands, and Peru is still the chief source of supply. Previous to the Civil War guano was extensively used as a fertilizer, but it has now been almost entirely replaced by cheaper materials. Guano made from menhaden is called *fish guano*, and that made from blood is called *blood guano*. See FERTILIZERS; MENHADEN.

Guarantee, *gar an tee'*, in law, an undertaking by which a person binds himself to

answer for the failure of another. In the United States no person is liable on any special promise to answer for the debt, default or miscarriage of another person, unless a written agreement, or some memorandum in writing for such purpose, shall be signed by the promiser or some other party lawfully authorized by him. It is a general rule that the guarantor shall not be bound beyond the express words of the engagement.

Guard, NATIONAL. See MILITIA.

Guardafui, *gwahr dah fwe'*, CAPE, next to Ras Hafun the most eastern point of Africa, at the entrance of the Gulf of Aden.

Guardian, *gahr'de an*, in law, the custodian of a person incapable of directing himself; especially, the custodian of an infant—that is, a person under twenty-one years of age. A guardian is not allowed to reap any benefit from his ward's estate, but must account for all profits. He can invest the money of his ward in real estate only by order of the court, and he can convert real estate into personality only by a similar order. If he spends more than the interest and profits of the estate in the maintenance and education of the ward, without permission of court, he may be held liable for the principal thus consumed. He is entitled to the care and custody of the person of his ward. Guardianship lasts until the ward has attained majority.

Guatemala, *gaw te mah'la*, the most northern republic of Central America, bounded on the n. and w. by Mexico, on the e. by Belize, or British Honduras, the Gulf of Honduras, Honduras and Salvador and on the s. by the Pacific Ocean. The area is 46,800 square miles, and the population is about 2,000,000. The country is mountainous or hilly in most places. A chain of mountains traverses it from the southeast to the northwest, and numerous branches extend from this in various directions. The scenery is noted for its variety and beauty. The mountains contain a number of volcanoes, two of which are considered active. One of these, Agua, has an altitude of 14,890 feet. The climate is tropical, there is an abundance of rain and the country is watered by a number of rivers flowing into the Atlantic and the Pacific. There are also in the mountainous regions a number of lakes. The hills and mountains contain forests of valuable timber. The soil is generally fertile, and agriculture is the leading occupation. The principal crops are corn, wheat, rice, coffee, cotton, tobacco, sugar, cochineal, cacao, indigo,

Guatemala

vegetables and tropical fruits. Ramie, henequen and other fiber plants are grown to some extent, and coffee is an important article of export. Most of the trade is with the United States and Great Britain. A railway extends from Saint Tomas on the Atlantic to San José on the Pacific coast, passing through Guatemala, the capital.

Most of the inhabitants are indians of Aztec and Toltec descent. Many of them are still uncivilized, and nearly all speak their native tongue. Only about one-third of the population are Europeans or of mixed descent. Considerable attention is paid to education, and children of all nationalities, even in the remote villages, are compelled to attend school. The government is republican in form, the executive officer being a president elected for four years. The important cities are Guatemala la Nueva, the capital; and Puerto Barrios and San José, the most important seaports. See GUATEMALA.

Guatemala or Guatemala la Nueva, the capital of the Republic of Guatemala, is situated in a plain 160 mi. n. w. of San Salvador. The town occupies a comparatively large area, since, on account of earthquakes, most of the houses are of one story. The chief place of interest is the great square, in which are located the old vice-regal palace, the cathedral, the archbishop's palace, the government offices, several schools, the barracks and most of the stores. The educational institutions include a university, a polytechnic school and a museum. The city maintains public libraries and has a number of hospitals, a national palace and a theater. The manufactures consist of muslins, cotton yarn, embroidery, artificial flowers and silver articles. The city is the chief center of trade for Guatemala and is connected by railroad with Saint Tomas on the Gulf of Honduras and San José on the Pacific. Population in 1910, estimated at 90,000.

Guava, *gwah'vah*, the popular name for certain small tropical trees with square branches, egg-shaped leaves and large white axillary flowers. The fruits are fleshy berries, which are usually apple-shaped or pear-shaped. The pulp is of an agreeable flavor, and a delicious and well-known jelly is made from it.

Guaviare, *gwah've ah'ray*, a river of Colombia, South America, an affluent of the Orinoco. It rises in the Andes not far from Bogota and flows easterly. It is navigable for most of its length, which exceeds 700 miles.

Guelder Rose

Guayaquil, *gwa'h ya keel'*, or **Santiago de Guayaquil**, a city and the chief seaport of Ecuador, on the Guayaquil River, here about 2 miles wide, about 40 miles above its mouth. Behind the town there is an extensive marsh, which makes the location unhealthy. There



GUAVA

is also a deficiency of water. However, the town is improving, has tramways and telephones and, in the new portion, fine buildings and streets. It has one of the best harbors on the west coast of South America. Its principal exports are cacao (to the value sometimes of \$5,000,000 annually), coffee, ivory, gold, silver, quinine, hides and nuts. Population, estimated at 45,000.

Gudgeon, *gui'on*, a fresh-water fish, belonging to the carp family, common in rivers of England. Neither jaw is furnished with teeth, but at the entrance of the throat there are two



GUDGEON

triangular bones, which perform the office of grinders. These fish are taken in gentle streams and measure only about six inches in length. Many are captured in nets for the market.

Guebers or Guebres, *ge'burz* or *ga'burz*. See GHEBERS.

Guelder, gel'dur, Rose, a name frequently given to the cultivated variety of the high bush cranberry. On account of the shape and color of the flower clusters, it is sometimes called the snowball. The fruit is of a pretty red color.

Guelph, *gwelf*, a city in Wellington co., province of Ontario, Can., on the Speed River and on the Grand Trunk and Canadian Pacific railroads. The river here has a fall of 30 feet, and furnishes power for organ and piano factories, flouring mills, iron foundries, woolen mills, rolling mills, sewing machine, furniture and farm implement factories. The surrounding country is agricultural and is also notable for stock raising. The town was first settled in 1827 and became a city in 1877. Population in 1911, 15,175.

Guelphs and Ghibellines, the names of two great Italian political factions in the thirteenth and fourteenth centuries. The names are derived from corruptions of the German *Welf* and *Waiblingen*, party designations in Germany in the war between Welf VI of Bavaria and Conrad of Hohenstaufen, to whom belonged the estate of Waiblingen. About the year 1200 the terms Guelph and Ghibelline came to be employed to denote, respectively, the Italian patriotic party, which demanded an Italy freed from German interference, and the imperial party, which supported the domination of the German emperors in Italy. After the fall of the Hohenstaufens, the Ghibellines became the partisans of aristocracy and the Guelphs were the partisans of democracy and liberty; but the designations came in time to denote mere family feuds.

Guereza, *ge re'zah*, a species of monkey remarkable for its beauty, inhabiting the mountains of Abyssinia. Short, glossy, jet-black fur covers its limbs, back and head, while a long fringe of silky white hair hangs from the flanks. It frequents lofty trees. See MONKEY.

Guernsey, *gurn'zy*, the second largest and most western of the Channel Islands, lying off the north coast of France, 46 mi. from Cherbourg and about 68 mi. s. e. of Start Point in Devonshire. The breeding of cattle and the dairy are the principal objects of attention; and the butter made is considered excellent. The island is especially famous for its fine breed of cows. Horticulture and floriculture also receive much attention, and fruits, especially figs and grapes, are very abundant. The chief towns are Saint Peter Port, the capital, and Saint Sampson. Population in 1911, 43,000.

Guerriere *gair yair'*, THE. See CONSTITUTION, THE.

Guiana, *ge ah'nah*, BRITISH, a colony in the northern part of South America, about 560 mi. long and about 200 mi. broad, bounded on the

e. by Dutch Guiana, on the w. by Venezuela and Brazil, on the n. and n. e. by the Atlantic Ocean and on the s. by Brazil. Its estimated area is 90,500 square miles, or more than half of all Guiana. It is divided into three settlements, Berbice, Demerara and Essequibo, and Georgetown is the capital of the whole colony. On the western boundary is the singular flat-topped and almost inaccessible mountain Roraima, rising to a height of 8600 feet. The other principal ranges are the Sierra Imataca, in the northern part of the country; the Canucu, or Conocou, and the Sierra Acarai, the last occupying the extreme southeast corner of the territory, forming its boundary in this direction. They are densely wooded, but do not reach a greater elevation than 4000 feet. The chief rivers are the Essequibo, Demerara, Berbice and Corentyn.

The climate, though moist and warm, is not on the whole unhealthful. Cultivation is confined to the coast region; the soil is very fertile, and much of it is well adapted for the sugar cane, the cultivation of which is mostly carried on by Indian and Chinese coolies. Guiana also produces coffee, tobacco, indigo, rice and other tropical plants. Vegetation is singularly luxuriant, and the forest trees are most magnificent. Fruits, medicinal plants, fibrous vegetables and dyeing woods abound. Guiana has two dry and two wet seasons, each continuing for three months; December, January, February, June, July and August constitute the wet seasons; the other months of the year are dry. The mean annual temperature is about 81°. Violent thunderstorms occur at the change of the seasons; but the hurricanes, so destructive in the West Indies, are unknown. The trade is concentrated mainly in Georgetown. Sugar, rum and molasses are the principal exports. The annual exports are about \$10,000,000, and the imports are about \$9,000,000. The government consists of a governor and a court of policy of 15 members; also a combined court, consisting of the court of policy and 6 financial representatives. Guiana was first settled by the Dutch about 1580. It was taken by the British in 1783, in 1796 and again in 1803, and finally it was given up to them. Population in 1911, 296,000, a great proportion being of African race or coolies from India.

Guiana, DUTCH, or **Surinam**, a Dutch colony in South America, situated between British Guiana and French Guiana, with an area of about 46,960 sq. mi. It is flat and swampy on

the coast and is mountainous in the interior. It is well watered by numerous streams, of which the Surinam and its tributaries are most important. The climate is warm and moist and the soil is very fertile. Only a small part of the land is under cultivation. The principal products are sugar, cacao, bananas, rice, maize and coffee, the total exports being valued at about \$2,250,000 annually. On the Surinam River, about 10 miles from its mouth, is situated the capital, Paramaribo. The government is vested in a governor-general and council, appointed by the queen, and an assembly, or States, consisting of four members appointed by the governor and one elected member for each 200 voters. Population in 1911, 86,233.

Guiana, **FRENCH**, or **Cayenne**, a French colony in South America, situated between Dutch Guiana and Brazil and having an area of about 30,500 sq. mi. This territory resembles British Guiana in its physical features, climate and vegetable productions, with the addition, in the latter case, of pepper, cloves, cinnamon and nutmeg. Less than one-third of the country is under cultivation, owing to the peculiarly unfavorable climatic conditions. The colony includes the island of Cayenne, celebrated for the pepper bearing that name. Off the coast is Devil's Island, famous as the place of imprisonment of Captain Dreyfus. Gold has been found in considerable quantities and constitutes the chief article of export. The colony is governed through a governor, appointed at Paris, and a privy council of seven members, besides a representative council of sixteen members. It also sends one delegate to the French Chamber of Deputies. It is held at a financial loss to France. The capital is Cayenne. Population in 1911, 49,009, of whom about 9,000 are convicts.

Guido D'Arezzo, *gwe'do dah ret'so*, or **Guido Aretino** (about 995—about 1050), one of the earliest of modern musicians. He was a Benedictine monk, and little is known of his life. He doubtless invented or at least adapted the present musical notation. This achievement secured for him the favor of the pope, who did much to popularize the new system. He probably also introduced the four-line staff, which marks an important step in the history of musical notation.

Guido Reni, *gwe'do ra'ne* (1575–1642), a celebrated Italian painter, born at Bologna. Being the son of a musician, he devoted some time to the study of music, but as painting seemed his true vocation, he was placed under the tuition of Denys Calveart. After his twentieth year he

entered the Eclectic, or Bolognese, school of painting and became one of its chief masters. He is particularly noted for the gentleness and sweetness of his characters and for his harmonious style of execution. The color and composition of his paintings are good, but originality and strength are lacking. Among his most famous works may be mentioned his *Aurora*, *Magdalene*, *Michael Vanquishing Satan*, *Lot and His Daughters*, *Fortune* and *Rape of Helen*.

Guild, *gild*, a society or association for carrying on commerce, a handicraft or some other undertaking. Such associations have been known from very early times in various countries, and they played a very important part in the Middle Ages. They often formed a bulwark against the oppression of the nobility and were thus conducive to the growth of municipal and civil liberty. In the thirteenth century the German guilds of craftsmen obtained the right of defending by arms their own interests, and they became so powerful that persons unconnected with the trade were often glad to attach themselves to them. With the view of destroying the influence which they had acquired, emperors at different times abolished them by decree, but it was not until late in the nineteenth century that unrestricted freedom to practice any trade was established in Germany. In Great Britain trade guilds long possessed an importance which was mainly political. As the right of voting was involved in the membership of a guild, many persons acquired the rights of "freemen" by connecting themselves with some body of this kind. These guilds, in England, had no legal right to prevent any man from exercising what trade he pleased. The guilds, or companies, of the city of London are still very important corporations, which give relief to poor and disabled members and also manage vast funds bequeathed for benevolent purposes. Many of the trades unions, especially in the United States, have now somewhat of the character of the ancient guilds.

Guilder, *gil'dur*. See FLORIN.

Guilford, *gil'furd*, or **Guilford Courthouse**, **BATTLE OF**, a brief but important and hotly-contested battle of the Revolutionary War, fought on March 15, 1781, between an American force under Greene and the British under Cornwallis. At first the British prevailed, and later the Americans, but the battle has been judged by military critics to have been a British victory. The American loss was about 400, and the British, 600. The defeat was changed into a strategic victory by Greene's superb general-

ship, and Cornwallis retreated to Wilmington and thence into Virginia, where he surrendered.

Guillemot, *gil'e mot*, the name of several web-footed birds, belonging to the family of auks. They have straight, compressed bills, covered with feathers as far as the nostrils; short, pointed wings, and short legs, far back under the body. They live principally on fish and build their nests on steep rocks near the sea.

Guillotine, *gil lo teen'*, an engine for beheading persons at one stroke, invented during the Middle Ages and adopted by the National Assembly of France during the French Revolution, on the proposal of Dr. Guillotin, after whom it is named. In this apparatus decapitation is effected by means of a steel blade, loaded with a mass of lead. This blade slides between two upright posts, grooved on their inner sides. The victim's neck is confined in a circular opening between two planks, the upper one of which also slides up or down.

Guilmant, *geel mahN'*, FELIX ALEXANDRE (1837-1911), an eminent French organist and composer. In 1853 he accepted a position as organist at the Church of Saint Joseph in Bologna, and this was followed by other important appointments, culminating in 1896 in a professorship at Paris Conservatory. He made several highly successful tours of Europe and America, his playing being characterized by wonderful orchestral effects and by brilliant execution and interpretation. Among his compositions for the organ is *Marche funebre et chant seraphique*.

Guinea, *gin'ee*, a geographical term applied to a part of western Africa, including the Atlantic coast line and an indefinite area of the interior, between the Senegal and Orange rivers, but now usually restricted to Portuguese Guinea and Angola. As formerly known, Guinea was divided into two districts. That called North, or Upper, Guinea, included Sierra Leone, Liberia, the Grain, Ivory, Gold and Slave coasts, the states Ashantee, Dahomey, Benin; the division known as South, or Lower, Guinea, included Kongo, Angola and Benguela. See PORTUGUESE GUINEA.

Guinea, an old English coin worth 21 shillings, or about \$5. Guineas were first coined in the reign of Charles II (1663), of gold brought from Guinea; they bore the figure of an elephant. In 1817 the coin was withdrawn from circulation, being superseded by the sovereign. It is, however, still customary to estimate professional fees in guineas.

Guinea, GULF OF, that portion of the Atlantic which washes the shores of Upper Guinea, between Cape Palmas and Cape Lopez; it includes the bights of Benin and Biafra. Fernando Po, Prince's and Saint Thomas islands are within this gulf.

Guinea Fowl, a genus of pheasants, originally all natives of Africa. The common guinea hen, now well known as a domestic fowl, has a slate-



GUINEA FOWL

colored plumage, varied with round white spots. It is about the size of a common fowl and is of a noisy and quarrelsome disposition.

Guinea Pig, a well-known little animal, about six inches long, usually variously spotted with black, white and brown. It is not a pig at all,



GUINEA PIGS

but a cavy, that is, an animal somewhat related to rats and rabbits. Guinea pigs are timid little creatures that feed on vegetable food and breed very rapidly. They make attractive pets for children.

Guise, *gweez*, a distinguished ducal family of France, a branch of the House of Lorraine. Several of its members took an important part in French history. The family acquired great political influence on the accession to the French throne of Francis II, who had been married to Mary Queen of Scots, the granddaughter of the first duke of Guise. Among the most famous of the family was FRANCOIS OF LORRAINE, duke of

Guise (1519–1563), who early distinguished himself in war, especially at Metz, which he defended with success against Charles V. Under Henry II and Francis II he was the real ruler of France. On the death of Francis II he was driven from France, but was recalled to take charge of the armies against the Huguenots. He won some successes, but while preparing to besiege Orleans, the central point of the Protestant party, he was assassinated. HENRY I of LORRAINE, third duke of Guise (1550–1588), the son of François, became the leader of the Catholic party on the death of his father and took a prominent part in the wars against the Huguenots. He was a leader in the massacre of Saint Bartholomew, and for sake of revenge he personally conducted the assassins to the house of Coligny. After defeating the allies of the Huguenots, he advanced to Paris, which Henry III, fearing his power, forbade him to enter. He disregarded the command and was received with great enthusiasm by the people, but Henry III, foreseeing the possibility of Guise making himself king, invited him to a conference and had him assassinated.

Guitar, *ge takr'*, a stringed musical instrument, with a hollow body and a neck somewhat similar to that of a violin, used especially to accompany the voice. The modern, or Spanish, guitar has six strings, the three highest being made of gut, the three lowest, of silk, covered with fine wire, tuned respectively to the E in the third space of the bass staff, the A above it and the treble D, G, B and E. The tone is produced by the vibration of the strings, from picking with the fingers, the pitch being regulated by pressing the wire against brass frets in the neck of the instrument, thus changing the length of the vibrating segment.



[GUITAR]

Guizot, *ge zo'*, FRANÇOIS PIERRE GUILLAUME (1787–1874), a French historian and statesman. His father, a lawyer, having in 1794 perished by the guillotine, his mother and her three sons retired to Geneva, where François was educated at the gymnasium. In 1805 he commenced legal studies at Paris, but gradually drifted into the literary profession. In 1812 he married Mlle. de Meulan, editor of the *Publiciste*, and in the same year he became professor of history at the Sorbonne. On the fall of the Empire he

obtained several public offices, such as councilor of state and director-general of the departmental and communal administration. He lost his offices and his position at the Sorbonne, on account of his openly expressed political principles, but in 1829 he was permitted to resume his lectures. After the July revolution of 1830, he was appointed minister of the interior, but resigned in 1831. After the death of Périer, Guizot, along with Thiers and De Broglie, formed a coalition ministry, and he rendered great service as minister of public instruction. He became ambassador at the British court in 1840, and in the next year he became the real head of the government of which Soult was the nominal chief. He retained the office of minister of foreign affairs until 1848, and during that period he opposed all measures of reform. After the fall of Louis Philippe, Guizot escaped and fled to England. Henceforth he practically retired from public life. Among his numerous works may be mentioned *The History of Civilization in France*, *General History of Civilization in Europe*, *History of the English Revolution*, *Washington* and *The History of France from the Earliest Times to the Year 1789*.

Gulden, *gool'den*. See FLORIN.

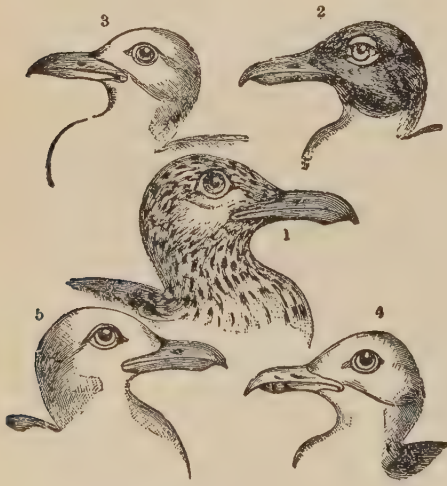
Gulf Stream, one of the most celebrated of the oceanic currents, so called because it issues from the Gulf of Mexico. It owes its origin to the fact that the westward-moving waters of the tropical portion of the Atlantic, encountering the eastward projection of South America, become divided into two currents, one setting southward along the Brazilian coast, and the other northward past the mouths of the Amazon and Orinoco, into the Caribbean Sea. It enters the Gulf of Mexico and thence emerges through the channel of Florida as the Gulf Stream. Its course is next to the north and eastward, in a direction parallel to the coast of the United States, past Cape Hatteras, along the southern edge of the "great banks" of Nantucket and Newfoundland, after which it loses identity as a distinct current.

In the earlier part of its course, especially when rounding the extremity of Florida, the Gulf Stream forms a well-defined current, distinguished by its high temperature and its deep blue or indigo color. On account of the descent of the Polar, or Baffin Bay, current along the coast in a direction opposite to that of the Gulf Stream, the water on its inland side is colder than that to the eastward of it. The difference of temperature between the Gulf Stream and

this cold current sometimes amounts to 20° or 30° F. The velocity of the Gulf Stream varies with its course. Within the Florida channel it attains a mean velocity of sixty-five miles per day; this sinks to fifty-six miles off Charleston, becomes thirty-six miles to forty-six miles off Nantucket and twenty-eight miles to the south of the Newfoundland Banks; three hundred miles to the eastward of Newfoundland its movement is hardly perceptible.

At the bottom of the Florida channel the observed temperature is 34°, that of the surface from 80° to 84°. Geographers have greatly exaggerated the influence of the Gulf Stream on the temperature of Europe. If it possesses any *direct* influence, such must be extremely small, as the current is both too narrow and too shallow, and its slight amount of superior heat probably vanishes after it has passed Cape Hatteras. The relatively high temperature of western and north-western Europe must rather be referred to the general set of the tropical waters to the north-east, and to the warm winds blowing in the same direction. See CURRENTS, MARINE.

Gulls, birds that live along the seacoast and on the waters of the interior, in almost all parts



1. Great black-backed; 2. black-headed; 3. kittiwake; 4, lesser black-backed; 5, herring gull.

of the world. They are very graceful on the wing and are seen usually in large flocks, feeding on every kind of animal food, putrid or fresh, which they can find. They catch fish with great skill, but are quite content to follow ships or to hang about harbors, gathering in the refuse from sewers, buildings and shipping. There

are a great many species, many of which resemble one another so closely that the ordinary observer cannot distinguish them. Their prevailing colors are white or bluish-gray, but black, slate color and brown are mixed in various ways in some species. The *great black-backed gull*, the *herring gull*, the *laughing*, or *black-headed*, gull, *Bonaparte's gull* and the *kittiwake gull* are common American species. The *lesser black-backed gull* belongs to Europe.

Gum, a substance of various properties, which exudes spontaneously from the bark of certain trees, such as the plum and the peach, or from the incisions made in the bark to facilitate the flow. Gums form non-crystalline, rounded drops, or tears, the purest varieties being transparent or translucent, usually pale yellow, but sometimes of a dark color. When dissolved in water, gum forms a thick, smooth fluid, which is more or less sticky. Some gums, such as gum arabic, dissolve in water; others, like tragacanth, are only partially soluble; all are insoluble in alcohol and are thus distinguished from resins. They have no odor and only a very faint taste. The different kinds of gum receive their names from the countries from which they are imported—such as gum arabic, gum Senegal, Barbary gum and East India gum; and from individual features—as cherry-tree gum and tragacanth. *Gum resins* require water and alcohol to dissolve them. See GUM RESINS; RESINS.

Gum Arabic, a yellowish or reddish gum, gathered from several species of acacia trees that grow in Asia and northern Africa. It is used in thickening ink and in making mucilage and pastes. See MUCILAGE.

Gumboil, an abscess in the gum, generally the result of toothache or of the presence of decayed teeth or stumps. The decayed tooth or stump, if the inflammation proceeds from this cause, should be removed; the boil should be opened, and the mouth should be washed frequently with tincture of myrrh and water.

Gum Resins, *res'ins*, solidified juices obtained from plants. They contain a gum, which is soluble in water, and a resin, which dissolves in spirits, so that the body usually is nearly soluble in dilute alcohol; but there are usually present, in addition, essential oil and a variety of impurities. The gum resins have frequently a strong and characteristic taste and smell. They are solid, opaque and brittle. They are used chiefly in medicine. The common gum resins are aloes, asafoetida, gamboge and myrrh. See GUM; RESINS.

Gumti, *gum'te*, or **Goom'ti**, a river of Hindustan which rises in the Northwest Provinces and, flowing southeasterly, falls into the Ganges near Benares. In its course it passes the cities of Lucknow and Jaunpur. Its length is about 500 miles.

Gun. See CANNON; RIFLE; SMALL ARMS.

Gunboat, a term applied to small war vessels, mounting usually a single gun and employed in coast defense or in attacking large and heavy armored vessels. Some gunboats are armed with one heavy deck gun, which can be turned in any direction by means of a pivot. In others the single gun is placed on a platform, which can be raised to the deck or lowered to the hold by a donkey engine. The gun in this case does not turn on a pivot, the maneuvering being effected entirely by the turning of the vessel. Steam gunboats, especially when iron plated, are most powerful auxiliaries to a fleet.

Gun Carriage, the structure on which a cannon is mounted and on which it is fired. Gun carriages are of various forms. In the case of a field or siege piece, the carriage is united, for traveling, with a two-wheeled forepart, termed a *limber*, to which the horses are attached, so as to form a single four-wheeled carriage. In action the gun is unlimbered and then rests on its pair of wheels and on a strong support, termed the *trail*. A gun in a fortress has its carriage commonly mounted on what is termed a *traversing platform*, that is, a strong framework, supported on metal trucks or small wheels. These trucks are constructed to run on metal rails, which are laid in concentric arcs of circles, whose center is a real or imaginary pivot close to the mouth of the embrasure through which the gun fires. By this means the muzzle of the gun, when run up, is brought nearly over the pivot, so that the direction of its fire may be changed considerably in lateral directions and yet allow of a very narrow embrasure. Carriages on the "disappearing principle" are visible to the enemy only during the acts of aiming and firing. The loading is effected under shelter. In one of these the carriage is so contrived that a heavy counterweight attached to it is sufficient to raise the gun into the position for firing, the sides of the carriage having some resemblance to the "rockers" of a rocking-horse. The recoil brings the gun down into the loading position, after which it is again brought into firing position as before. The iron carriages now made are thus elaborate mechanical structures. In mortars a cast-iron bed takes the place of a carriage.

Guncotton or **Pyrox'lyn**, a highly explosive compound, made by soaking vegetable fiber in a mixture of nitric and sulphuric acids and allowing it to dry. Cotton is the fiber generally used, hence the name *guncotton*. Guncotton is used in the manufacture of celluloid, collodion and varnishes. Military guncotton is highly explosive and is used for charging torpedoes and in exploding mines. A form of guncotton known as *pyrocellulose* is used by the United States navy in making smokeless powder.

Gunpowder, an explosive, consisting of a mixture of saltpeter, sulphur and charcoal. The origin of gunpowder is unknown. It was used by the Chinese before the beginning of the Christian era, and it was known to the nations of Europe in the thirteenth century; but it did not come into general use in war until the sixteenth century.

The first essential in the manufacture of gunpowder is purity of materials. The saltpeter is purified by dissolving it in hot water and allowing it to crystallize. The sulphur is purified by distillation, and the charcoal is obtained by burning willow or alder in cast-iron retorts. Each of these substances is ground to powder; then all three are mixed in the proper proportions in revolving cylinders. The mixture is then moistened and ground between heavy stone rollers. The lime thus produced is sent to a hydraulic press, where it is subjected to different degrees of pressure, according to the grade of powder desired. A high pressure produces powder that burns quickly and has a high explosive power, while a low pressure gives a slow-burning powder. As the mass, called the *press cake*, leaves the press, it goes to the granulating machine, where toothed rollers break it into grains of various sizes, which are sorted by a series of screens. The powder is then polished by being placed for several hours in revolving wooden barrels. After this it is dried and is ready for use. The powder used in rifles is more highly explosive than that used for blasting and in cannon. Blasting powder contains 70 parts saltpeter, 18 parts sulphur and 12 parts charcoal. That used in cannon contains 75 parts saltpeter, 15 parts sulphur and 10 parts charcoal. Smokeless powder, dynamite and other explosives have largely replaced powder for many purposes. See BLASTING; DYNAMITE; SMOKELESS POWDER.

Gunpowder Plot, a conspiracy formed in England in the reign of James I, by some

Roman Catholics, to put to death the king and Parliament, by wrecking the House of Parliament by an explosion of powder, in order to be revenged on the government for the severities against their religion. The plot originated with Robert Catesby, Guy Fawkes and others, and the time fixed for its execution was November 5, 1605, when Parliament was to be opened by the king in person. The plot was discovered by means of a letter sent by one of the conspirators to a relative of his, a Catholic peer in favor with the court, warning him not to be present at the approaching meeting of Parliament. Fawkes, with several others, was tried at Westminster and put to death.

Gunter's Chain. See CHAIN.

Gur'nard, Sea Robin or **Grunter**, a family of fishes of which there are about forty known species, living in tropical waters. They are remarkable for having three finger-like appendages on the under side, which serve as organs of locomotion as well as of touch. On being taken out of the water they make a grunting noise. One strange species is the *flying gurnard*, or *sea bat*, remarkable because of its enormous spreading wings. It is found along the eastern coast of the United States and around the southern coast of South America.

Gustave V (1858—), king of Sweden and son of Oscar II, came to the throne in December,



GUSTAVE V

1907, on the death of his father. The new queen was Princess Victoria of Baden and is cousin

of Emperor William of Germany. During the years before his accession Gustave frequently acted as vice-regent, filling the position with such capability as to assure his success as king.

Gustav'us I, commonly called Gustavus Vasa (1496–1560), king of Sweden. He was the son of a Swedish noble, served in the struggle for Swedish independence, was treacherously carried off with other Swedes by the king of Denmark and was kept a prisoner in Jutland for more than a year. At length, however, he escaped, reached, after many dangers, Dalecarlia, where he roused the peasants to resist Danish oppression, defeated the Danes, took Upsala and other towns and in 1523 was elected king. In 1529 he procured the abolition of the Roman Catholic religion in Sweden and established Protestantism. During his long reign Sweden made great progress in commerce and civilization.

Gustavus II Adolphus (1594–1632), king of Sweden, a grandson of Gustavus Vasa, came to the throne in 1611. He was trained to war under experienced generals, took his place in the state councils at the age of sixteen, and was in command of the army in his seventeenth year during the war with Denmark, by which Sweden recovered important possessions on the Baltic. He then turned his arms against the Russians and drove them from Ingria, Karelia and a part of Livonia, which were secured to him by the peace of Stolbova in 1617. His first great war was that with Poland, which lasted nine years and was concluded favorably for Gustavus in 1629. His attention was then diverted from northern wars by the affairs of Germany. The oppression of the Protestants by Ferdinand II excited his sympathy, and the progress of Wallenstein alarmed him; perhaps, too, he was moved by ambition for foreign conquests. He embarked for Germany in 1630, landed near the mouth of the Oder and in a short time had seized nearly all of Pomerania. After taking many fortified towns, defeating the imperial generals at Leipzig, Würzburg, Breitenfeld and the Lech and conquering a great part of Germany, he was killed in the Battle of Lützen, in which, however, his army was victorious (See THIRTY YEARS' WAR). Though a severe disciplinarian, he was beloved by his soldiers, and the prestige of success derived from his victories lasted long after his death.

Gustavus III (1746–1792), king of Sweden, succeeded to the throne in 1771. Finding the country weary of the misrule of the nobles, he

gained the good will of the army, surrounded the States-General and forced them to accept a new constitution, which much restricted their privileges. In 1788 he took command of the army against Russia and Denmark, but he accomplished nothing of importance. On the outbreak of the French Revolution he made strenuous exertions to form a coalition between Russia, Denmark, Sweden and Spain, but, while he was making his preparations, a conspiracy of the nobles was formed against him and he was shot at a masked ball.

Gustavus IV Adolphus (1778-1837), king of Sweden, son of Gustavus III, whom he succeeded in 1792. On assuming power Gustavus showed that he had inherited his father's hatred of the principles of the French Revolution, which he carried to the extent of fanaticism. After the Peace of Tilsit he exposed himself to a war with Russia while he was at war with France, by refusing to join the Continental blockade and by opening his ports to England; and in 1808 he quarreled with England, his only ally. Finland was lost to Sweden, and in 1809 a revolution took place, in which Gustavus was dethroned, and his uncle, the duke of Sudermania, was proclaimed king as Charles XIII.

Gutenberg, *goo'ten berK*, JOHANNES (1400-1468), the inventor of printing with movable blocks. His original name was Johann Henne Gensfleisch; Gutenberg was probably his mother's family name. Of the details of his life, apart from the invention which has immortalized him, but little is known with certainty. He was born in Mainz of noble family and was a prominent man in his native city until, in about 1420, he was with others obliged to leave, on account of political dissensions. Several years after his departure from Mainz, he was employed in Strassburg on mechanical works. In 1448 Gutenberg was again in Mainz, and two years later he formed a partnership with Johann Faust, or Fust, a money lender, who was to furnish the capital for carrying on the business of printing. After five years Faust sued for money advanced and got possession of most of the printing outfit. As Gutenberg's name did not appear on any of his printed works, it has been difficult to identify them, but he is known to have printed several religious books. During the last years of his life he was a courtier at the court of Archbishop Adolphus. Statues have been erected to his honor in many cities, among which is one by Thorwaldsen, erected in 1837 in Mainz.

Faust and his son-in-law, Peter Schöffer, continued the business and claimed the credit of the invention, but the latter's son, Johann Schöffer, states in a preface of 1505 that the "admirable art of printing was invented in Mainz in 1450 by the ingenious Johann Gutenberg and was subsequently improved and handed down to posterity by the capital and labor of Johann Faust and Peter Schöffer." Gutenberg's claim to the invention has been strongly contested in favor of Coster, but it now seems to be established. By his invention the letters were separated, and the use of movable blocks was possible for the first time. See PRINTING.

Guth'rie, OKLA., capital of Oklahoma and the county-seat of Logan co., 32 mi. n. of Oklahoma City, on Cottonwood Creek and on the Missouri, Kansas & Texas, the Santa Fé and other railroads. The city was laid out and settled in 1889, on the day that the territory was opened for settlement, and it became the capital the next year. The place has developed rapidly and now has an extensive trade. The factories include cottonseed oil, lumber and flour mills, foundries and machine shops, furniture and carriage works. The principal buildings are the capitol, the city hall, the Carnegie library, a Federal prison, a Scottish Rite Temple, Saint Joseph's Academy and several other schools. Population in 1910, 12,000.

Gutta-percha, *gut'ta pur'cha*, (a Malay name meaning *gum tree*), a substance resembling india rubber in many of its properties, but stronger, more soluble and less elastic. It is the milky juice of certain trees found in Malacca, Borneo and other islands of the Indian Archipelago. When pure, gutta-percha is of a brownish-red color. Below the temperature of 50°, it is as hard as wood and excessively tough. By an increase of heat it becomes more flexible, until, at a temperature of 115° F., it becomes pasty, and between this and 140° or 150° it may be molded into all varieties of forms with the greatest ease, retaining precisely the same form as it cools and hardens to its previous state of rigidity. It is insoluble in water, is soluble with difficulty in ether and other rubber solvents, but mixes very readily with oil of turpentine and naphtha. It is not attacked by solutions of alkalies nor by hydrofluoric acid, but it is acted on by sulphuric, nitric and hydrochloric acids. Gutta-percha has been applied to a variety of purposes, as a substitute for leather, especially in the soles of shoes and

other articles; as an insulating coating for the copper wires of submarine telegraph cables;



GUTTA-PERCHA

as an ingredient in mastics and cements; for the manufacture of flexible hose tubes and bottles, and for many other purposes.

Gutzkow, *goots'ko*, KARL FERDINAND (1811–1878), a German writer, born in Berlin. After studying theology he took to journalism and politics and became the leading spirit of a small body of reformers known as "Young Germany." In 1835 his first novel, *Wally, the Skeptic*, appeared. It was at once declared by the government to be hostile to religion and society, and the author was imprisoned for three months. Besides this important novel, he wrote two others, *The Knights of the Soul* and *The Magician of Rome*, which attained wide popularity and influence. He was active, also, in dramatic literature, his dramas *Richard Savage*, *Uriel Acosta*, *Queue and Sword* and *The King's Lieutenant* having been very popular.

Guyot, *ge o'*, ARNOLD (1807–1884), a Swiss-American geographer and physicist, born near Neuchâtel, Switzerland. He studied theology at Berlin, then took up natural science and became professor of history and physical geography in the Academy of Neuchâtel. He shared in Agassiz's investigations of glacier phenomena of the Alps. In 1848 he came to the United States and delivered lectures in Boston, after-

ward published under the title *Earth and Man*, and used extensively as a text-book on physical geography. He rendered much service to meteorological science in connection with the Smithsonian Institution. In 1855 he was appointed professor of geology and physical geography in Princeton.

Gwalior, *gwah'le or*, a city and fortress of Central India, capital of the State of Gwalior, situated 65 mi. s. of Agra. The fortress is the largest, the strongest and the most magnificent in India. It stands on an isolated rock about 350 feet high and nearly perpendicular in the upper part. The fortress contains wells and reservoirs of water and is inaccessible except by steps up the side of the rock. Old Gwalior, the town at the northern angle of the base of the rock, is built of stone and has some remarkable ruins of temples, besides an interesting example of old Hindu palace architecture. The new town, known as New Gwalior, or Lashkar (the camp), the residence of the ruler, Maharajah Sindhia, has sprung up recently on the southeast skirt of the rock, but it is already a flourishing city, with a population of 46,900.

The State of Gwalior, politically under the protectorate of the British government of India, consists of several portions of territory, otherwise known as Sindhia's Dominions, the largest and most compact portion, usually known as Gwalior, being the one containing the above town and fortress. The total area is 29,047 sq. mi. It is not as a whole very fertile; one of its most notable products is opium. Population in 1911, 3,090,798.

Gymnasium, *gim nah'ze um* or *jim na'ze um*, a term applied in Germany to a class of schools occupying a middle place between elementary schools and universities. The gymnasias are the feeders of the universities, and the training adopted in them is specially intended to equip the pupils for entering these institutions. The last, or exit, examination, to show whether the pupils are fit to enter the university, is very severe and includes history, Latin and Greek and at least one modern foreign language.

In the United States the word is usually applied to a building or room equipped for exercise and athletic uses. Gymnasiums are attached to almost all schools and colleges, and in many cities various clubs and societies support them. Many of the larger high schools have fine rooms, abundantly equipped with varied apparatus, where the pupils take regular and systematic exercise under trained instructors.



7a



6a



1a



2a



3a



4a



5a



7b



6b



5b



8b



2b



3b



4b



1b

BROWN TAIL MOTH

1A Egg Mass and Moth laying eggs
2A Winter nest
3A Full grown Caterpillar
4A Male Pupa

5A Female Pupa
6A Male Moth
7A Female Moth

GYPSY MOTH

1B Egg Mass
2B Full Grown Caterpillar
3B Female Pupa
4B Male Pupa

5B Male Moth
6B Male Moth at rest
7B Female Moth
8B Female Moth laying eggs

In the crowded districts of many large cities, open-air gymnasiums, where children may amuse themselves, are now being established and equipped with swings, bars, rings, trapezes and other simple and inexpensive apparatus. See ATHLETICS.

Gymnastics, *jim nas'tiks*, the technical term used to designate any system of exercises specially designed to promote the development of physical and, especially, muscular powers. An excellent gymnastic training is given by baseball, football, rowing and similar amusements, but the special value of formal gymnastic exercises is that they are capable of being scientifically arranged so as to secure not only a general development of muscular power, but also to give suitable training to the separate muscles. Furthermore, they are capable of being applied to each person so as to meet, allow for and, as far as possible, overcome defects in his physical organization. For these purposes an elementary course of gymnastics is of great value to all, especially to the person of sedentary habits.

Two general rules may be laid down, which form an efficient guide in self-imposed exercises. The first is the universal rule in mechanics, that the strength of any machine is the strength of its weakest part; the second is the fundamental law of muscular exercise, that it is exercise *within* the extreme power of a muscle which develops and improves, while *straining* a muscle weakens and injures it, and excessive exercise develops particular muscles at the expense of the general health. It is quite possible, indeed, to carry general physical exercises too far, and to develop muscular power at the expense of vital strength. Till the age of twelve the ordinary games and pastimes of childhood are generally quite sufficient exercise; after that some very light system of gymnastics may be adopted to aid the development of the system. After the age of thirty-five, unusual muscular efforts are apt to leave persistent strains, and moderate exercise becomes the safest means of developing and giving tone to the muscular system.

Gypsies, *jip'siz*, a wandering nation, whose physical characteristics, language and customs differ much from those of European nations. They call themselves Rommany, from *rom* (man). The gypsies are now considered to have come from India, the main body of their language, though mixed with a great number of borrowed words, having a close affinity with some of the Indian languages. Gypsies are

remarkable for the yellow-brown or, rather, olive color, of their skin, the jet-black of their hair and eyes, the extreme whiteness of their teeth and, generally, the symmetry of their limbs. The typical gypsies rarely settle permanently anywhere, but live in tents, wandering about working in wood and iron, making domestic utensils, telling fortunes and practicing tricks. Their talent for music is remarkable, and some of their melodies have become the much-valued property of other nations or are incorporated in some favorite operas. They have no stated religion. The marriage ceremony is of the simplest kind. If the husband becomes tired of his wife, he will turn her off without a qualm. The children grow up in idleness and acquire the habits of stealing and cheating. In England the gypsies first appeared about the beginning of the sixteenth century and, notwithstanding severely repressive enactments on the part of the government, continued to maintain themselves as tinkers and mat and basket makers. Considerable numbers of the British gypsies have emigrated to America, where they settle among the people and lose their distinctive characteristics. There are probably about a half million in southeastern Europe, but their numbers are everywhere decreasing.

Gypsum, *jip'sum*, the name generally given calcic sulphate. It is found in a compact state as *alabaster* (See ALABASTER), or crystallized as *selenite*, or in the form of a soft, chalky stone, which in a very moderate heat changes to a very fine white powder, extensively used under the name of plaster of Paris. This last is the most common and is found in great masses near Paris; large beds are also found in Nova Scotia, Virginia, Michigan, New York, Iowa and Ohio. It may be geologically of any age, but it occurs abundantly in the more recent sedimentary formations and is even now forming, as a deposit from water holding it in solution; from the decomposition of iron pyrites, when the sulphuric acid combines with lime, or from the action of sulphurous vapors in volcanic regions on rocks containing lime. When gypsum occurs without water it is called *anhydrite*, but in its most ordinary state it is combined with water. Gypsum, pulverized by grinding or burning, has been used with good effect as a fertilizer, especially as a top dressing for meadows. See FERTILIZERS.

Gypsy Moth, an insect which has long been exceedingly destructive to fruit and shade trees in central Europe, and which in 1869 was intro-

duced into America by a man who was experimenting to find a silkworm which would be free from disease. Some of his specimens accidentally escaped, and although he called the attention of the public to the fact, yet the matter was neglected until about twenty years later, when their ravages became so severe that the legislature of Massachusetts was compelled to take action to exterminate them.

The male moth is described as brownish-yellow, varying to greenish-brown in color, with a slender body and an expanse of wings ranging from one to one and one-half inches. The wings are darker than the body and have prominent black markings. The flight is characterized by a peculiar zigzag motion, which assists in identifying the insect. The body of the female is light buff and covered with hairs which are used by the moth to protect the eggs when they are deposited. The wings have an expanse of nearly ten inches, and are nearly white, with small black markings. However, because of the large size of the body, the female is unable to fly.

The eggs are deposited in July and August in clusters about three-fourths of an inch wide and an inch and a half long, forming a yellowish hair-covered mass. The clusters vary in size and contain from 75 to 1000 eggs.

The eggs hatch about the first of May and the larvae or caterpillars feed upon the foliage of fruit and shade trees until mid-summer, when they enter the pupal state. The caterpillars are hairy, and when full grown have a sooty-colored body, containing on the back a double row of red spots. The head is yellow. Before they are half grown the caterpillars frequently suspend themselves from branches of trees and drop upon animals and carriages, by which they are taken to localities not previously infested. The sudden appearance of these caterpillars in such localities may often be accounted for in this way.

The caterpillars prefer the leaves of the oak,

the willow, the elm and the apple tree, but they will feed upon the foliage of all fruit and shade trees, and when other sources of food fail, will attack vines, shrubs and even garden and field crop in their vicinity. They even attack the white pine, and in some localities have caused the destruction of many of these trees.

The best method found for destroying the growing caterpillars is by spraying the trees with a solution of arsenate of lead, using ten pounds of arsenate to one hundred gallons of water. The spraying is most effective when done in May and June. The egg clusters can be killed by soaking them thoroughly with a creosote mixture. This work can be done effectively between August and May. Banding the trees with strips of burlap or other coarse cloth, in such a manner that the bands fold over and form a shelter for the caterpillars, is a good means of destroying large numbers. The caterpillars crawl under the folds during the night and the bands should be examined daily. At the end of the season the bands should be burned. Infested areas should be cleared of all brush, and hollow trees and untilled lands where egg clusters are supposed to exist should be burned over.

Gyroscope, *ji'ro skope*, an instrument for showing certain properties of rotation. It consists of a circular disk with a heavy rim, mounted upon an axis so that it will revolve with the least possible resistance. In the complete gyroscope, this axis is also mounted in a circular frame, which can be rotated in a direction at right angles to that of the disk, and the entire apparatus rests upon a circular standard, so that it can be turned in any direction. When revolving rapidly the disk is not easily moved out of its plane of rotation, and the axis retains its same direction, though the gyroscope be moved around a circle. For this reason the apparatus is sometimes used to explain the continual pointing of the earth's axis in the same direction. Small gyroscopes are used as toys.

